

THE IMPORTANCE OF BEING FACTUAL: THE U.S., CHINA, AND THE FUTURE OF THE KYOTO PROTOCOL

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ABSTRACT

By most accounts, the December 2012 Doha Round negotiations achieved little. The continued failure of member governments to reach consensus increases the risk of a catastrophic rise in global emissions. The current impasse is due in no small measure to the expressed concern of the United States that a climate change treaty will end up transferring enormous wealth from the United States to China.

Analyzing the relevant market data, this Article concludes that there is little or no evidence to support the notion that ratification of the Kyoto Protocol will lead to the massive wealth transfers feared by the United States. Indeed, the market study demonstrates the opposite. By deconstructing the “China myth,” this Article achieves two tasks. First, it rebuts the principal argument that U.S. policy-makers and the Senate have offered to justify the United States’ refusal to ratify the Kyoto Protocol. Second, in taking China out of the equation, it enables U.S. climate justice theory to resume the arrested conversation about the obligations of the United States, and other developed nations, to address the problem of global emissions.

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INTRODUCTION

The Doha round of climate negotiations in December 2012 produced little results, in no small measure because of the United States' concerns.¹ Despite the risk of incalculable harms and consequences to life and livelihood posed by the rise of greenhouse gas emissions, the United States is reluctant to sign an emissions accord.² This is because the United States contends that emissions trading will entail an enormous and unfair wealth transfer from the United States to China, thus making what Professor Dan

1. See, e.g., Roger Harrabin, *UN Climate Talks Extend Kyoto Protocol, Promise Compensation*, BBC NEWS (Dec. 8, 2012, 2:20 PM), <http://www.bbc.co.uk/news/science-environment-20653018>; Michael Jacobs, *The Doha Climate Talks Were A Start, But 2015 Will Be The Moment of truth*, GUARDIAN, Dec. 10, 2012, at 19, available at <http://www.guardian.co.uk/commentisfree/2012/dec/10/doha-climate-talks-global-warming>; Barbara Lewis & Alister Doyle, *Despair After Climate Conference, But UN Still Offers Hope*, REUTERS (Dec. 9, 2012, 11:14 AM), <http://www.reuters.com/article/2012/12/09/climate-talks-process-idUSL5E8N7BQV20121209>.

2. U.N. ENV'T PROGRAMME, THE EMISSIONS GAP REPORT 2012 16 (2012), available at <http://www.unep.org/pdf/2012gapreport.pdf>.

Farber calls the “China argument.”³

In the scholarly literature, the case for and against the United States ratifying the Kyoto Protocol⁴ is framed as a choice between justice theory and moral theory. Eric Posner and Cass Sunstein are examples of justice theorists in this area,⁵ contending that the United States is not obligated to ratify the Kyoto Protocol under prevailing theories of justice because “[t]he Kyoto Protocol imposed no obligations on China, now the biggest emitter and placed heavy burdens on the United States.”⁶

Professor Dan Farber responds to Posner and Sunstein’s argument from justice theory⁷ with an argument from moral theory.⁸ Farber forcibly argues that the United States has a moral obligation to ratify the Kyoto Protocol, because of its wealth and history of significant past and

3. Daniel A. Farber, *Climate Justice and the China Fallacy*, 15 HASTINGS W.-NW. J. ENVTL. L. & POL’Y 15, 16 (2009). For a classic exposition on justice theory and the China fear that dominates American academic and political response on global greenhouse gas emissions, see generally Eric A. Posner & Cass R. Sunstein, *Climate Change Justice*, 96 GEO. L.J. 1565 (2008). Similarly, Jonathan Wiener directly related U.S. climate policy to China. See, e.g., Jonathan Wiener, *Climate Change Policy and Policy Change in China*, 55 UCLA L. REV. 1805, 1806 (2008) (“To solve the climate change problem, the United States must act, and it must engage China.”). See also Cass R. Sunstein, *Of Montreal and Kyoto: A Tale of Two Protocols*, 31 HARV. ENVTL. L. REV. 1, 9 (2007) [hereinafter Sunstein, *Of Montreal and Kyoto*]; Cass R. Sunstein, *The World vs. the United States and China? The Complex Climate Change Incentives of the Leading Greenhouse Gas Emitters*, 55 UCLA L. REV. 1675, 1676 (2008) [hereinafter Sunstein, *The Complex Climate Incentives*]; Cass R. Sunstein, *Climate Change: Lessons from Reagan*, N.Y. TIMES, Nov. 11, 2012, at SR4, available at <http://www.nytimes.com/2012/11/11/opinion/sunday/climate-change-lessons-from-ronald-reagan.html> (“As in the case of the Montreal Protocol, an effective response to climate change requires many nations to act. China is the biggest greenhouse gas emitter on the planet, and it must become a leader in international negotiations”); Cass Sunstein, *U.S. Should Act Unilaterally on Climate Change*, BLOOMBERG (Jan. 23, 2013, 6:55PM), <http://www.bloomberg.com/news/2013-01-23/u-s-should-act-unilaterally-on-climate-change.html> (stating that those opposing U.S. participation in the Kyoto Protocol emphasize “developing nations (above all China)” do not have binding commitments).

4. See Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec 10, 1997, 37 I.L.M. 22 (1998) [hereinafter Kyoto Protocol], available at <http://unfccc.int/resource/docs/convkp/kpeng.pdf>.

5. Posner & Sunstein, *supra* note 3, at 1572. See also Farber, *supra* note 3, at 15; Daniel A. Farber, *The Case for Climate Compensation: Justice for Climate Change Victims in a Complex World*, 2008 UTAH L. REV. 377, 378 (2008); Jody Freeman & Andrew Guzman, Essay, *Climate Change and U.S. Interests*, 109 COLUM. L. REV. 1532, 1534 (2009); Sunstein, *Of Montreal and Kyoto*, *supra* note 3, at 7; Sunstein, *The Complex Climate Incentives*, *supra* note 3, at 1677. For similar arguments in the press see Elizabeth Rosenthal & Andrew W. Lehren, *Profits on Carbon Credits Drive Output of a Harmful Gas*, N.Y. TIMES, Aug. 9, 2012, at A1.

6. Posner & Sunstein, *supra* note 3, at 1600 (emphasis added). Even so, they believe America should participate in the Kyoto Protocol, albeit for very different reasons. *Id.* at 1572.

7. See generally Posner & Sunstein, *supra* note 3.

8. Farber challenges Posner & Sunstein’s empirical and normative claims on corrective and distributive justice. See generally Farber, *supra* note 5; Farber, *supra* note 3. For a brief summary of the Posner & Sunstein vs. Farber debate, see Freeman & Guzman, *supra* note 5, at 1534, 1537.

continuing high level of greenhouse gas contributions.⁹ This deontic response, of course, fails to answer the essentially instrumentalist argument that U.S. legal scholars and the U.S. government make regarding the Kyoto Protocol.¹⁰

Both justice and moral theorists proceed on the presumption that if the United States signs the Protocol, the economic consequences will be to transfer wealth from the United States to China.¹¹ To date, however, legal scholars have not examined actual data to determine whether this underlying assumption is rooted in fact. This Article is the first to examine whether the evidence supports the presumption - will vast sums of U.S. money drain into China, if the United States ratifies the Kyoto Protocol. This Article introduces evidence that casts serious doubts on this assumption.

The United States opposes the Kyoto Protocol because under the existing regime, the United States and China occupy very different positions and have dissimilar rights and obligations. On the one hand, if the United States ratifies the Kyoto Protocol, as an industrialized nation, the United States will become subject to legally binding emission reduction targets, which the United States fears that it will be unable to meet. China on the other hand, as a developing country, is encouraged, but not legally required, to limit its greenhouse gas emissions.¹² The Kyoto Protocol allows countries to register and earn “carbon credits” for activities that reduce greenhouse gas emissions.¹³ Nations can “sell” their surplus credits to countries that have failed to meet their targets. China has no specific target, and has earned the maximum number of credits to date.¹⁴ Therefore, the United States fears that it will not be able to meet its target specified in the Kyoto Protocol, and so, if it ratifies the Kyoto Protocol, it will be compelled to purchase carbon credits from China, the largest supplier;

9. Farber, *supra* note 5, at 379–80; Farber, *supra* note 3, at 15.

10. See Wiener, *supra* note 3, at 1812–16 (arguing (a) in the context of global warming, nations place limited value on moral arguments, and (b) appealing to the country’s gains at the national and global levels would be a better strategy).

11. See Jacobs, *supra* note 1; Lewis & Doyle, *supra* note 1.

12. *List of Non-Annex I Parties to the Convention*, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/parties_and_observers/parties/non_annex_i/items/2833.php (last visited Dec. 23, 2013). See also *CDM Rulebook: Non Annex I*, BAKER & MCKENZIE, <http://cdmrulebook.org/973> (last visited Dec. 23, 2013).

13. This Article uses carbon market to refer to the market established by the Kyoto Protocol’s Clean Development Mechanism rules. These credits are commonly known as “certified emission reductions.” See *infra* Part II for detailed discussion on different types of markets and credits that can be traded thereunder.

14. Historically, China has accounted for over fifty percent of the total carbon credit supply. For details see *infra* Part II.

resulting in enormous wealth transfer from the United States to China. As Eric Posner and Cass Sunstein comment, “[I]ndeed, the cost to the United States might have been as high as 80% of the total [expense of the Kyoto Protocol].”¹⁵

This Article introduces empirical evidence that raises serious questions on whether the Protocol will result in transferring U.S. wealth to China, as previously assumed. The data suggests the “China argument” may be a myth (the “China myth”). In Part I, this Article will provide a brief background on the existing literature. Specifically, scholars have been grappling with the question of U.S. participation in the Kyoto Protocol, against the backdrop of the Protocol’s different treatment of the United States and China. Neither justice theorists nor moral theorists have been able to provide a cogent theory justifying U.S. participation in the Kyoto Protocol, if China will receive vast sums of U.S. money, in the event the United States participates in the Kyoto Protocol. In Part II, this Article will describe the Kyoto Protocol, particularly, the market created thereunder that has been a key source of the United States’ ire and objection to the Protocol. This study will review the contracts and transactions consummated in the existing carbon market (namely, the Clean Development Mechanism established by the United Nations Framework Convention on Climate Change and Kyoto Protocol) to determine who owns the carbon credits, and whether the United States will be required to turn over vast sums to China under the present market regime.¹⁶ This Article is the first effort to mine the Kyoto Protocol’s carbon marketplace for evidence of the economic effect of carbon credit sales,¹⁷ and to that

15. See Posner & Sunstein, *supra* note 3, at 1611.

16. See *Clean Development Mechanism*, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php (last visited Dec. 23, 2013). See also United Nations Framework Convention on Climate Change, May 9, 1992, U.N. Doc. FCCC/Informal/84 [hereinafter UNFCCC]. The UNFCCC has a long history and was negotiated at the United Nations Conference on Environment and Development, held in Rio de Janeiro between June 3–14, 1992.

17. See, e.g., NICHOLAS STERN, *THE STERN REVIEW: THE ECONOMICS OF CLIMATE CHANGE* (2006); WILLIAM NORDHAUS & JOSEPH BOYER, *WARMING THE WORLD* (2000); Robert Mendelsohn, Ariel Dinar & Larry Williams, *The Distributional Impact of Climate Change on Rich and Poor Countries*, 11 ENV’T & DEV’T ECON. 159 (2006). A sub-set of economists generally believes that the United States will profit from global warming. See, e.g., Sunstein, *The Complex Climate Incentives*, *supra* note 3. Freeman & Guzman strike a slightly different economic approach, stressing that the current approaches underestimate the impact of climate change on the U.S. and the spill-over effects from abroad, and arguing that overall the U.S. would not be a net-gainer. Freeman & Guzman, *supra* note 5, at 1539–40. But Freeman & Guzman’s theorem requires the law to first accept and adopt a more commodious notion of cost-benefit for climate change than usually accepted. The few Articles on carbon credits have focused solely on country of origin, and not proceeded to examine the market. See, e.g., Tyler McNish, *Carbon Offsets are a Bridge Too Far in the Tradable Property Rights Revolution*, 36 HARV. ENVTL. L. REV. 387 (2012); James Salzman & J.B. Ruhl, *Currencies and the*

extent it joins the literature on environmental markets generally.¹⁸

Part III will analyze the empirical data and demonstrate that the United States will lose little money to China through emissions trading. The raw data essentially depict the lion's share of China's carbon credits are presold to traders in advanced countries. Over 90 percent of Chinese industrial initiatives that earned carbon credits have sold the credits to principals in advanced countries.¹⁹ As a result, the United States does not have to fear that if it enters the market as a buyer (because it is unable to meet its emissions targets required by the Kyoto Protocol), it will be compelled to purchase credits from China, transferring huge sums of money to China.²⁰ China has sold a vast majority of its stake to corporations, a majority of which are based in Europe or Japan. These corporations have executed forward purchase contracts and have bought over ninety percent of China's entire portfolio.²¹ China may own very few credits (less than the 8 percent) that it originally received.²² As a result, little to no future revenues arising from U.S. entry into the market will be sent to Beijing.²³ Similarly, if the market collapses as a result of U.S.

Commodification of Environmental Law, 53 STAN. L. REV. 607, 628–29 (2000); Michael Wara, *Measuring the Clean Development Mechanism's Performance and Potential*, 55 UCLA L. REV. 1759 (2008); Rosenthal & Lehren, *supra* note 5.

18. There is extensive literature on environmental markets. *See generally* Bruce A. Ackerman & Richard B. Stewart, Comment, *Reforming Environmental Law*, 37 STAN. L. REV. 1333 (1985); Daniel J. Dudek & John Palmisano, *Emissions Trading: Why is This Thoroughbred Hobbled?*, 13 COLUM. J. ENVTL. L. 217 (1988); Robert W. Hahn & Robert N. Stavins, *Incentive-Based Environmental Regulation: A New Era from an Old Idea?*, 18 ECOLOGY L.Q. 1 (1991); Howard Latin, *Ideal Versus Real Regulatory Efficiency: Implementation of Uniform Standards and "Fine-Tuning" Regulatory Reforms*, 37 STAN. L. REV. 1267 (1985); Thomas W. Merrill, *Explaining Market Mechanisms*, 2000 U. ILL. L. REV. 275 (2000); Jonathan Baert Wiener, *Global Environmental Regulation: Instrument Choice in Legal Context*, 108 YALE L.J. 677 (1999).

19. *See infra* Figure 6.

20. For estimates on the cost of signing the Kyoto Protocol see, e.g., Cass R. Sunstein, *It's Only \$300 Billion*, WASH. POST, May 10, 2006, available at <http://www.washingtonpost.com/wp-dyn/content/article/2006/05/09/AR2006050901502.html>. For other estimates see NICHOLAS LINACRE ET AL., WORLD BANK, STATE AND TRENDS OF THE CARBON MARKET 2011 9 (2011), available at http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/StateAndTrend_LowRes.pdf (estimating the United Nations' carbon market at approximately \$20 billion per year in primary and secondary market transactions during 2009 and 2010); A. DENNY ELLERMAN, HENRY D. JACOBY & ANNELENE DECAUX, WORLD BANK, THE EFFECTS ON DEVELOPING COUNTRIES OF THE KYOTO PROTOCOL AND CO₂ EMISSIONS TRADING 21–22 (1998), available at <http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-2019> (assessing the cost at \$38 billion, and \$35 billion (with trading)).

21. *See infra* Part III.B.

22. *Id.*

23. The outflow from the United States to Europe and Japan will be even lower because this Article only analyzes data from "first sales" or the initial sale of credits from China, which is publicly available. Subsequent sales are not included.

refusal, China will remain unaffected (since it has already alienated its credits) and any future market losses will be borne by buyers in other countries. Thus, this Part will show the facts do not support the China argument that prevents the United States from participating in the Kyoto Protocol. After laying out the facts that debunk the China myth, Part IV will remark on the theoretical implications of the empirical results, and provide select observations on the future development of a normative theory of climate justice. The concluding remarks will spotlight the importance of factual and data analysis to legal scholarship.

Critics could argue, as they often do with empirical research that the study engages in static projection and fails to consider the longer term reaction of the system to the change.²⁴ In this case, critics could contend - What if China files for and earns *new* credits rapidly, as soon as the United States ratifies the Protocol? Then, significant U.S. wealth will still flow into China, undercutting the analysis here. This possibility may be set to rest on the basis of facts. If the United States ratifies the Protocol, and is looking for credits, it could easily buy on the secondary market (the huge trove of China's credits are now owned foreign or non-Chinese entities).²⁵ According to the UNFCCC, it has issued over a billion credits from 2001 to 2012, exceeding U.S. targets indicated in the Kyoto Protocol.²⁶ Moreover, Chinese corporations must fulfill many international rules, receive approvals from U.N. bodies and external, non-Chinese organizations before receiving a credit and as a practical matter, they cannot earn credits and flood the market so quickly.²⁷ By showing that there is a significant group of buyers, and stock of credits available outside of China to meet any potential U.S. need in future years, this study provides policy-makers with information relevant to the future; overcoming any potential objection that the analysis is "static," or the data and conclusion have no relevance for the future. This, and other objections shall be addressed in detail in Part III.B.4.'s *Response to Possible Objections*.

A general objection may be that this international treaty was not created to benefit traders or strategic investors such as the World Bank and

24. Static projection or analysis or scoring means simplified analysis where the effect of an immediate change to a system is calculated without respect to the longer-term response of the system to that change. I am grateful to Professor Tom Merrill for raising this possibility.

25. See *infra* Part III.B.

26. See *News Release: Kyoto Protocol's CDM Passes One Billionth Certified Emission Reduction Milestone*, U.N. FRAMEWORK CONVENTION ON CLIMATE CHANGE (Sept. 7, 2012), https://cdm.unfccc.int/CDMNews/issues/issues/1_P0QZOY6FWYYKFKOSAZ5GYH2250DRQK/viewnewsitem.html.

27. For the procedures required before credits are awarded, see *infra* Part II.C.

Goldman Sachs.²⁸ This Article focuses on the question of whether the facts corroborate the China argument, and so, the generic debate on the purpose of the Protocol is beyond the scope of this Article.

In addition to contributing to the theoretical literature, this Article assists American climate policy. This study does not intend to be a comprehensive answer to the objection that China may gain a competitive advantage over U.S. manufacturing industry. By exposing the China argument as a myth, this survey eliminates the abiding thorn preventing multiple administrations from ratifying the Kyoto Protocol. Even though studies show market based solutions are a most efficient solution for pollution hazards and would potentially save billions of dollars annually,²⁹ the Senate opposes and blocks U.S. participation in the international emissions treaty.³⁰ Citing China, by unanimous vote, the Senate refused to ratify the Kyoto Protocol in 1998.³¹ Such a vote was ironic, given then Vice President Al Gore's heavy involvement in designing the Protocol.³²

28. See Rosenthal & Lehren, *supra* note 5 (observing the credits bought by Honeywell and Goldman Sachs). This position is particularly noteworthy, because Rosenthal and Lehren are otherwise critical of carbon credits. See also *About the World Bank Carbon Finance Unit (CFU)*, WORLD BANK, <https://wbcarbonfinance.org/Router.cfm?Page=About&> (last visited Dec. 23, 2013) (“Unlike other World Bank development products, the CFU does not lend or grant resources to projects, but rather contracts to purchase emission reductions similar to a commercial transaction, paying for them annually or periodically once they have been verified by a third party auditor.”). For the World Bank Carbon Finance Unit's portfolio, see *Project Portfolio*, WORLD BANK, <http://wbcarbonfinance.org/Router.cfm?Page=ProjPort&ItemID=24702> (last visited Dec. 23, 2013).

29. For a general discussion on market based pollution trading programs and the billions of dollars they would save annually, see Ackerman & Stewart, *supra* note 18, at 1339; Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law: The Democratic Case for Market Incentives*, 13 COLUM. J. ENVTL. L. 171, 171 (1988); Richard B. Stewart, *Controlling Environmental Risks Through Economic Incentives*, 13 COLUM. J. ENVTL. L. 153, 156 (1988). For a discussion on the advantages of the carbon trading platform specifically, see RICHARD B. STEWART & JONATHAN B. WIENER, *RECONSTRUCTING CLIMATE POLICY: BEYOND KYOTO* 11–16 (2003).

30. See, e.g., Senator Hagel's comments on the Senate floor during the debate on ratifying the Kyoto Protocol: “We are also interested in why the administration is advocating legally binding emissions reductions for the United States and not for nearly 130 other countries, like China We look forward to hearing from Under Secretary Wirth on this issue and the apparent inequalities inherent in any such agreement. Related to this, we are also interested in how the administration intends to curb the future growth of greenhouse gas emissions in countries like China, who would not be subject to the same legally binding emissions, but whose emissions will soon eclipse our own.” S. Rep. No. 105-54, at 10 (1997).

31. The U.S. Senate, by a 95-0 vote, unanimously passed the Byrd–Hagel Resolution which states that the United States should not be a signatory to any protocol that does not include binding targets and timetables for China and other developing nations as well as industrialized nations, or “would result in serious harm to the economy of the United States” S. Res. 98, 105th Cong. (1997) (enacted).

32. During President Clinton's term, Vice President Al Gore “symbolically signed” the Kyoto Protocol on Nov. 12, 1997 even though it was never intended to be ratified by the United States (because of the Byrd-Hagel Resolution). See Al Gore, *Moving Beyond Kyoto*, N.Y. TIMES, July 1, 2007, at 413. Moreover, the United States originally advocated the use of tradable allowances, which Europe

Because of the Senate's position, at the international level the Obama administration continues to insist that China's legal caps are relevant and tied to any U.S. participation in an international agreement.³³

The U.S. Senate's fear of China, or the China argument, has not only prevented America from ratifying the Kyoto Protocol, but, according to Energy Secretary Steven Chu, it has also hampered the passage of domestic laws.³⁴ Hence, though this Article primarily addresses U.S. opposition to international regulation, it has insights useful for domestic regulation as well.

This Article is timely: earlier this year, California established the largest cap and trade scheme in the United States to date, a market which is expected to generate more than a billion dollars in revenue annually.³⁵

opposed. In the end, the United States repudiated trading and Europe embraced it. *See* David M. Driesen, *Sustainable Development and Market Liberalism's Shotgun Wedding: Emissions Trading Under the Kyoto Protocol*, 83 IND. L.J. 21, 34 (2008); Sunstein, *The Complex Climate Incentives*, *supra* note 3, at 1681.

33. In spite of calls by European and African nations to set stronger emission targets, President Obama's negotiators never acceded to the Kyoto Protocol. Senator John Kerry, the principal sponsor of the Senate climate bill, stated "'Having China at the table was the most critical thing because most of our colleagues are saying, 'Well what about China? What about China?'" Darren Samuelsohn, *Obama Negotiates 'Copenhagen Accord' with Senate Climate Fight in Mind*, N.Y. TIMES (Dec. 21, 2009), <http://www.nytimes.com/cwire/2009/12/21/21climatewire-obama-negotiates-copenhagen-accord-with-senat-6121.html?pagewanted=all> (quoting then Senator John Kerry).

34. The Energy Secretary made these comments in the context of the Senate's refusal to pass President Obama's proposed domestic cap and trade bill, S. 1733, 111th Cong. (2009), even though the House passed it. *Cap and Trade War: Team Obama Floats a Carbon Tariff*, WALL ST. J. (Mar. 30, 2009, 12:01 AM), <http://online.wsj.com/article/SB123837276242467853.html> ("But give Mr. Chu credit for candor. He had previously told the New York Times that 'The concern about cap and trade in today's economic climate is that a lot of money might flow to developing countries in a way that might not be completely politically sellable.'") (quoting Secretary of Energy Steven Chu); Elizabeth Williamson, *Obama Retreats from Goal of Cap-Trade Bill*, WALL ST. J. (Feb. 3, 2010, 12:01 AM), <http://online.wsj.com/article/SB10001424052748704022804575041632860721438.html>; Matt Negrin, *Whatever Happened to Cap and Trade?*, ABC NEWS (July 17, 2012), <http://abcnews.go.com/Politics/OTUS/environment-happened-cap-trade-global-warming/story?id=16790018>. Fears are fanned on the costs of cap and trade. For example, estimates claim it will cost American households an additional \$1,761 per annum, more than double the average \$900 annual tax cut provided by President Obama under the American Recovery Act. Or, cumulatively, the costs are estimated at \$200 billion to \$366 billion per year, or a 15 percent tax increase. *See* Declan McCullagh, *Obama Admin: Cap And Trade Could Cost Families \$1,761 A Year*, CBS (Sept. 15, 2009, 9:03 PM), http://www.cbsnews.com/8301-504383_162-5314040-504383.html (citing the Treasury Department estimates obtained under the Freedom of Information Act by the Competitive Enterprise Unit); *Tax Cuts for the Middle Class*, WHITE HOUSE, <http://www.whitehouse.gov/issues/taxes> (last visited Dec. 24, 2013) ("[A] typical [middle class] family making \$50,000 a year has received tax cuts totaling \$3,600 . . ."). California provides a notable exception to this federal trend and recently started implementing a cap and trade scheme under AB 32. *See infra* note 35.

35. *See* California Global Warming Solutions Act, CAL. HEALTH & SAF. CODE § 38501 (2006) (Assembly Bill 32). *See also* Julie Cart, *California Becomes First State to Adopt Cap-and-Trade Program*, L.A. TIMES (Oct. 21, 2012), <http://articles.latimes.com/2011/oct/21/local/la-me-cap-trade->

President Obama announced that if the Senate does not pass a cap and trade law, his Cabinet would take executive action during his State of the Union address in 2013.³⁶ The Obama Climate Action Plan announced in June, directed the Environment Protection Agency (“EPA”) to issue regulations governing power plants. This September, the EPA announced the first of these, prescribing carbon pollution standards for new power plants. Moreover, the Supreme Court will also be examining this issue - the Supreme Court granted certiorari on October 15, 2013, in *Utility Air Regulatory Group v. EPA*, allowing six lawsuits to challenge the EPA’s various greenhouse gas regulations.³⁷ This decision comes close on the heels of the D.C. Court of Appeals’ decision in *Coalition for Responsible Regulation v. EPA* in June 2012³⁸ where the court reaffirmed the Federal Government’s power to impose limits on emissions. This case law clearly signals judicial intent to build on the Supreme Court’s jurisprudence in *Massachusetts v. EPA*.³⁹ Hence, the time is particularly ripe for the analysis in this Article.

A final note before moving into Part I: this Article will, consistent with academic and judicial positions, treat the following as established stances. First, this Article will not seek to prove climate change or the science behind it. In keeping with the decision in *Coalition for Responsible Regulation*, the “extent to which these changes ‘can be attributed to human-induced buildup of atmospheric greenhouse gases,’” shall be considered as

20111021; Felicity Barringer, *A Grand Experiment to Rein in Climate Change*, N.Y. TIMES, Oct. 14, 2012, at A23. A regional cap and trade system, the Regional Greenhouse Gas Initiative (“RGGI”) was also adopted by 10 northeastern states with the goal of reducing emissions. See Robert N. Stavins, *A Meaningful U.S. Cap-and-Trade System to Address Climate Change*, 32 HARV. ENVTL. L. REV. 293, 302 (2008).

36. President Barack Obama State of the Union Speech, POLITICO (Feb. 12, 2013, 9:15 PM) available at <http://www.politico.com/story/2013/02/state-of-the-union-2013-president-barack-obamas-speechtranscript-text-87550.html>.

37. *Coal. for Responsible Regulation, Inc. v. EPA*, 684 F.3d 102 (D.C. Cir. 2012), cert. granted sub nom., *Chamber of Commerce of the U.S. v. EPA*, 134 S.Ct 468 (U.S. Oct. 15, 2013) (No. 12-1146).

38. *Coal. for Responsible Regulation, Inc. v. EPA*, 684 F.3d 102, 133–34 (D.C. Cir. 2012) (holding that EPA regulations were rational and not arbitrary and requiring the permitting to be extended to major emitters).

39. In *Massachusetts v. EPA*, 549 U.S. 497, 528 (2007), the Supreme Court held that the Environment Protection Agency (“EPA”) had jurisdiction to regulate greenhouse gas emissions (because greenhouse gas emissions fell within the definition of “air pollutant” under the Clean Air Act, 42 U.S.C. §§ 7401–7671g). The Supreme Court further remanded the case to the EPA, and ordered the agency to review its contention that it had discretion to decide whether or not to regulate emissions. The Court found the current rationale for not regulating to be inadequate and required the agency to articulate a reasonable basis in order to avoid regulation. In *Coalition for Responsible Regulation, Inc.*, 684 F.3d 102 at 133–34, the court went a step further to state the law required the federal government to limit emissions.

well-established and no longer in question.⁴⁰ Second, this Article will focus on the market and forego digressing into the market versus carbon taxes or regulation debates.⁴¹ This stand is supported by academics as well as President Obama.⁴²

I. THEORISTS' ASSUMPTION

The scholarship supporting and opposing U.S. participation in the Kyoto Protocol is divided along two lines: justice theory and moral theory. Putting forward the classic justice theory position, Eric Posner and Cass Sunstein posit, "The Kyoto Protocol imposed no obligations on China, now

40. Coal. for Responsible Regulation, 684 F.3d 102 at 119 (citations omitted). *See also id.* at 122 ("In *Massachusetts v. EPA* the Supreme Court confirmed that EPA may make an endangerment finding despite lingering scientific uncertainty. Indeed, the Court held that the existence of 'some residual uncertainty' did not excuse EPA's decision to decline to regulate greenhouse gases. *Massachusetts v. EPA*, 549 U.S. at 534, 127 S.Ct 1438. To avoid regulating emissions of greenhouse gases, EPA would need to show 'scientific uncertainty...so profound that it precludes EPA from making a reasoned judgment as to whether greenhouse gases contribute to global warming.' *Id.* Clearly, then, EPA may issue an endangerment finding even while the scientific record still contains at least 'some residual uncertainty.' Industry Petitioners have shown no more than that.") After years of debate, this position is also now generally accepted in legal scholarship and most articles proceed on the assumption that climate science and the role of human activities is well-established. *See, e.g.*, Farber, *supra* note 5, at 377; Freeman & Guzman, *supra* note 5, at 1532; Posner & Sunstein, *supra* note 3, at 1566–67.

41. There is voluminous literature debating the merits of tax or regulatory approaches in contrast to market solutions. *See generally* Reuven S. Avi-Yonah & David M. Uhlmann, *Combating Global Climate Change: Why a Carbon Tax is a Better Response to Global Warming than Cap and Trade*, 28 STAN. ENVTL. L.J. 3 (2009) (generally arguing for carbon tax rather than cap and trade schemes); David M. Driesen, *Is Emissions Trading an Economic Incentive Program?: Replacing the Command and Control/Economic Incentive Dichotomy*, 55 WASH. & LEE L. REV. 289 (1998); Richard Toshiyuki Drury et al., *Pollution Trading and Environmental Injustice: Los Angeles' Failed Experiment in Air Quality Policy*, 9 DUKE ENVTL. L. & POL'Y F. 231 (1999) (criticizing cap and trade based upon the specific experience with the Los Angeles Mobile Source Credits "(specifically, the Rule 1610 'car scrapping' program) and RECLAIM").

42. *See generally* STEWART & WIENER, *supra* note 29; Ackerman & Stewart, *supra* note 18; Ackerman & Stewart, *supra* note 29; Stewart, *supra* note 29; Stavins, *supra* note 35, at 296; Cass R. Sunstein, *Democratizing America Through Law*, 25 SUFFOLK U. L. REV. 949 (1991) (acknowledging a flexible option like a global emissions trading system is a central piece of any agreement to reduce greenhouse gas emissions). *See also* Thomas Merrill & David M. Schizer, *Energy Policy for an Economic Downturn: A Proposed Petroleum Fuel Price Stabilization Plan*, 27 YALE J. ON REG. 1, 1 (2010) ("[I]n a recession the appropriate fiscal policy is to cut taxes, not to raise them."). In fact, David Schoenbrod and Richard Stewart criticize the American Clean Energy and Security Act of 2009 (or the Waxman-Markey Bill) as excessively regulatory rather than providing an efficient market solution. Moreover, they point to prior cap and trade successes, such as acid rain causing emissions. David Schoenbrod & Richard Stewart, *The Cap-and-Trade Bait and Switch*, WALL ST. J. (Aug. 24, 2009, 12:42 PM), <http://online.wsj.com/article/SB10001424052970203609204574314312524495276.html>. Then Presidential candidate Barack Obama stated, "a cap-and-trade system is a smarter way of controlling pollution' than 'top-down' regulation." *Id.* (quoting then Senator Barack Obama). *See also* POLITICO, *supra* note 36.

the biggest emitter, and placed heavy burdens on the United States. In this light, the claim that American policy has been negligent, under prevailing legal standards, is far-fetched.”⁴³ Posner and Sunstein correctly recognize the United States’ concern regarding the costs of reducing emissions, stating, “reductions would likely impose especially large costs on the United States”⁴⁴ Next, without further investigation, they assume “*costs*” means an outflow of U.S. money to other nations.⁴⁵ They then criticize this outflow from the United States as (a) crude means of producing redistribution, or (b) problematic because it compels “many people who have not acted wrongfully” to pay people who are not victims of climate change.⁴⁶ In short, Posner and Sunstein’s theory is based on the assumption that *money will flow out of the United States*. This argument implies that it is unfair for China to receive massive sums of U.S. money.⁴⁷ Elsewhere, Sunstein also claims the Kyoto Protocol fails because of this requirement that the United States ought to pay other countries (chiefly, China).⁴⁸ In contrast, Sunstein submits that the Montreal Protocol succeeds because it did not unfairly insist on U.S. payments to other nations.⁴⁹

In sum, Posner and Sunstein conclude justice theory does not support payments from the United States to other nations (implicitly, China),⁵⁰ and so, this theory does not back U.S. participation in the Kyoto Protocol. This fact is poignant because, far from opposing the United States’ involvement in the climate accord, Posner and Sunstein believe, “an international agreement to control greenhouse gases, with *American participation, is justified*, and all things considered, the United States should probably participate *even if the domestic cost-benefit analysis does not clearly justify such participation.*”⁵¹

43. Posner & Sunstein, *supra* note 3, at 1600. See also Farber, *supra* note 5, at 390 (critiquing the logic in Posner & Sunstein’s argument as incorrectly conflating marginal harm with total harm); Jason Scott Johnston, *Climate Change Confusion and the Supreme Court: The Misguided Regulation of Greenhouse Gas Emissions Under the Clean Air Act*, 84 NOTRE DAME L. REV. 1, 47–48 (2008).

44. Posner & Sunstein, *supra* note 3, at 1565.

45. See, e.g., *id.* at 1565 (“On reasonable assumptions, redistribution from the United States to poor people in poor nations would be highly desirable Many people who have not acted wrongfully end up being forced to provide a remedy to many people who have not been victimized.”).

46. *Id.*

47. In the introduction to their article, Posner and Sunstein set up their theory against the backdrop of China. See *id.* at 1567–68.

48. See Sunstein, *Of Montreal and Kyoto*, *supra* note 3, at 60–61 (discussing the two Protocol’s different treatment of the common yet differentiated responsibilities principle).

49. *Id.* at 47.

50. It is not only this author’s inference that they implicitly oppose payment to China. For Farber’s characterization of the justice theorists’ position, see Farber, *supra* note 5, at 390.

51. Posner & Sunstein, *supra* note 3, at 1572 (emphasis added) (citations omitted). See also *id.* at 1611–12 (“*If the United States agrees to participate* in a climate change agreement on terms that are not

Dan Farber responds to Posner and Sunstein's justice argument with a moral argument. First, Farber pithily summarizes the justice theorists' argument as follows: "[W]e only have a duty to reduce emissions or assist victims of climate change if China reduces emissions"⁵² In short, if China is not compelled to reduce its emissions, *ipso facto*, U.S. responsibility for its emissions is dissolved.⁵³

Next, Farber explains his moral response to Posner and Sunstein's justice theory:

China's potential responsibility for climate change, however great, would not erase our own responsibility, and because in fact our emissions will continue to be harmful (and perhaps become even more harmful) even if China's emissions are unchecked. In short, the China argument should be rejected as a fallacy in considering American climate policy, and in particular should be seen as completely irrelevant to whether we have a duty to finance adaptation by developing countries. It goes without saying that China's future emissions are critically important to the U.S. and to the world – but our own conduct remains our own responsibility.⁵⁴

According to Farber: The United States has *moral duties* to (a) "impose reasonable curbs on future emissions" and (b) "help other countries, especially poorer countries, adapt to . . . climate change"—duties that are independent and "not conditional on whether other countries—in particular China—take action."⁵⁵ However, this deontic response fails to quell the China alarm, a lacuna which Farber acknowledges. He notes that, "[W]e also have to be realistic about the extent to which we can expect moral considerations to influence policy, especially where large amounts of money are involved."⁵⁶

Thus, justice and moral theorists' position may be summarized as follows: (a) Justice theorists maintain they would like the United States to participate, but theory does not obligate the United States to join the

in the nation's interest, but that help the world as a whole, *there would be no reason to object*") (emphasis added).

52. Farber, *supra* note 3, at 16.

53. The China excuse put forward is very similar to the carbon leakage claim that many scholars raise. For instance, Posner and Sunstein point out that even if the United States aggressively pursues emission reduction, it will not halt global temperature rise if no caps are placed on China's emissions. Similarly, it is argued, any effort at mitigation is futile because it will be overwhelmed by greenhouse gases generated elsewhere – especially, because energy intensive industry would relocate to unregulated jurisdictions ("leakage problem"). For a fuller explanation, see, for example, Freeman & Guzman, *supra* note 5, at 1543. *See also*, Wiener, *supra* note 3, at 1807–08 (linking directly the China factor and the leakage issue.).

54. Farber, *supra* note 3, at 19–20.

55. *Id.* at 15.

56. Farber, *supra* note 5, at 381.

Protocol, *because* of China, (b) Moral theorists contend the United States is responsible for its emissions, *in spite of* the China factor (conceding in reality the United States will not ratify a legal solution that does not similarly bind China).⁵⁷ In short, both theories proceed on the presumption of massive wealth transfer to China; without any investigation of whether this China anxiety is indeed supported by evidence.

This Article, in contrast, examines the accuracy of this assumption and asks whether market facts support the China myth. Part II will therefore explain the provisions of the Protocol and the market it established that gives rise to the China anxiety.

II. THE TREATY AND ITS MARKET

The United Nations Framework Convention on Climate Change (“UNFCCC”) is the single largest international treaty executed for the purpose of stabilizing and preventing an increase in the greenhouse gas concentrations in the atmosphere. The treaty aims to prevent greenhouse gas concentration that would cause dangerous anthropogenic interference with the climate system.⁵⁸ The UNFCCC is legally non-binding since it does not set any compulsory limits on greenhouse gas emissions for individual nations nor does it contain any enforcement mechanism.⁵⁹ The Convention, however, establishes the following: (a) a framework to negotiate specific treaties (or “Protocols”) that would set binding limits on greenhouse gases, and (b) “a legislative-like body” (or the “Conference of Parties” or “COP”) to meet annually for the purpose of implementing the UNFCCC goals.⁶⁰ In the 1997 annual meeting in Japan, the Conference of Parties negotiated a legally binding document, the Kyoto Protocol.⁶¹ As Professor Michael Wara notes, “To date, the most substantial effort to

57. *Id.*

58. See UNFCCC, *supra* note 16, at art. 2; see also Michael B. Gerrard, *Introduction and Overview*, in GLOBAL CLIMATE CHANGE AND U.S. LAW 1, 17 (Michael B. Gerrard ed., 2007) (“ [The UNFCCC] was opened for signature at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992. The United States Senate ratified it on October 7, 1992, and President George H.W. Bush signed it less than a week later. It came into force in 1994 and now has 189 parties.”).

59. See UNFCCC, *supra* note 16; Kyle W. Danish, *The International Regime*, in GLOBAL CLIMATE CHANGE AND U.S. LAW 31, 33 (Michael B. Gerrard ed., 2007).

60. See Danish, *supra* note 59, at 33.

61. Though the United States and then Vice President Al Gore played a central role in negotiating the Kyoto Protocol, the Senate refused to ratify it. Hence, though Vice President Al Gore “symbolically signed” the Protocol, it did not become a part of U.S. law. Thereafter, in March 2001, President George W. Bush expressly repudiated it. See *supra* note 32 and accompanying text; Gerrard, *supra* note 58, at 19.

address climate change is the Kyoto Protocol Although not ratified by the United States and only recently by Australia, the Protocol was *signed and ratified by every other large developed country* and entered into force on February 16, 2005.”⁶²

The main controversies surrounding the Kyoto Protocol arise from the following three provisions: First, in order to reduce emissions to a level that is “30 percent below what would have occurred under [a] ‘business as usual’ scenario,” each country agreed to reduce its emissions by a percentage below its 1990 emissions.⁶³ The United States for instance agreed to reduce its emissions to 7 percent below its 1990 emissions.⁶⁴ Countries having different national targets, created a first set of controversies, and aggravated the second problem presented by developed and developing countries being subject to unlike obligations.

Second, furthering the “common but differentiated responsibilities” principle originally expressed in the Convention, the Protocol puts developed and developing countries in two different categories.⁶⁵ Advanced economies have binding targets, while developing nations have optional goals.⁶⁶ The developing countries that signed the Convention are called “Non-Annex I Countries” (“developing nations” or “developing countries”).⁶⁷ The United States objects to being included in Annex I of the Convention (with the concomitant binding targets), because of the third factor, the emissions market.⁶⁸

Third, to provide countries with flexible options to meet their targets, the Kyoto Protocol allows countries to: (a) document and receive credit for the emissions they reduced, and (b) possibly trade any surplus credits.⁶⁹ For

62. Wara, *supra* note 17, at 1760 (emphasis added).

63. See Gerrard, *supra* note 58, at 18. Though nations should typically agree to reduce emissions below the 1990 emissions baseline, there are some notable exceptions. Some parties such as Australia, Russia and others have not only negotiated no reductions, but even an increase in total caps. See Wara, *supra* note 17, at 1767 n.38 (“These nations include Australia (108 percent), Iceland (110 percent), New Zealand (100 percent), Norway (101 percent), Russia (100 percent), and Ukraine (100 percent).”). See *id.* at 1766–77.

64. Gerrard, *supra* note 58, at 18.

65. *Id.* See generally Gore, *supra* note 32 (arguing that the principle of common yet differentiated responsibilities is here to stay and is relevant to any future treaty).

66. See UNFCCC, *supra* note 16, art. 4, Annex I (describing the commitments to be given from the countries in Annex I).

67. See Kyoto Protocol, *supra* note 4, at art.12.

68. See, e.g., Sunstein, *Of Montreal and Kyoto*, *supra* note 3, at 6–7 (arguing that while he believed a global emissions market would benefit the world at large, for the United States the costs of the Kyoto Protocol and its emissions market would outweigh the benefits).

69. Kyoto Protocol, *supra* note 4, at arts. 17, 6, 12. See also Aarthi S. Anand, *Carbon Credit Not A License to Pollute*, NEW INDIAN EXPRESS, Mar. 4, 2010, at 11 (“Cap and trade mechanisms . . . should be seen as a bridge . . . enabling industry and nations to move to green energy. . . . Countries are

example, suppose the United Kingdom's target is to reduce its emissions by 100 tonnes, and it succeeds in lowering its emissions by 110 tonnes. In that case, the United Kingdom could *sell* the extra 10 tonnes to any other nation that fails to achieve its target. Since developing nations do not have binding commitments under Article 3 of the Protocol, they could potentially sell all the permits they earned.⁷⁰ This aspect shall be further examined in the subsequent paragraphs.

The Kyoto Protocol provides two types of flexible mechanisms, namely, the clean development mechanism ("CDM")⁷¹ and the joint implementation mechanism ("JI").⁷² As shown in Figure 1 below, the CDM and JI systems are designed along similar lines with one distinction—whether the countries selling and buying the permits are developing or advanced nations (i.e., listed as an Annex I or a Non-Annex I country).⁷³

not compelled to purchase credits – rather the international treaty terms provide for emission reduction targets. If nations cannot meet targets, trading mechanisms allow them to purchase these credits rather than incur undefined penalties for default. Nations and industries would be unwilling to sign up for legal commitments absent from a clear make-up mechanism. Credit trading offers a workable Plan B . . .").

70. See Danish, *supra* note 59, at 46 ("Through the CDM, Annex I governments . . . can purchase 'Certified Emission Reductions' generated by emission reduction projects in non-Annex I countries."). See also Kyoto Protocol, *supra* note 4, at art. 3 (providing commitments only for Annex I countries).

71. Kyoto Protocol, *supra* note 4, at art. 12.

72. See Kyoto Protocol, *supra* note 4, at art. 6 ("[A]ny Party included in Annex I may transfer to, or acquire from, any other such Party emission reduction units resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases in any sector of the economy . . ."). See also Danish, *supra* note 59, at 44–46 (explaining Article 6 rules for joint implementation).

73. The differences between the platforms are over-simplified for the discussion in this Article. International Emissions Trading ("IET") is a third flexible mechanism available under the Protocol. However, unlike the other two schemes, under IET each Annex I Party was allotted a fixed number of allowable emissions over a five year commitment period. IET does not permit parties to earn additional units (to sell them on the market). Plus, China is not an Annex I Party, and so cannot sell on this platform. As a result, IET is largely unopposed by the United States and thus is not included in this Article. See Kyoto Protocol, *supra* note 4, at art. 17, Annex I. See also Danish, *supra* note 59, at 42 ("The Article 17 trading system is very similar to the Sulfur Dioxide Emissions Program established under Title IV of the [U.S.] Clean Air Act. Under each program, the regulated entities are required to hold certain permits to cover their emissions. Under the Protocol, the regulated entities are national governments, while the Title IV system regulates power plants. Under the Protocol, the permits are AAUs [Assigned Amount Units]; the Title IV system uses 'allowances.' Each program allocates a certain amount of permits to its regulated entities and allows the entities to trade them freely.").

FIGURE 1

Market	Seller	Buyer
CDM	Developing country e.g. China	Industrialized nation e.g. United Kingdom (U.S., if it agrees)
JI	Industrialized nation	Industrialized nation

In sum, the CDM platform is utilized when an industrialized nation (or Annex I) buys permits from an upcoming economy (or Non-Annex I country). As Figure 1 indicates, the JI market is used when both parties to the sale are advanced countries. The United States mostly opposes the CDM platform, hence, this Article will focus on this market specifically. As explained earlier, for easy reading, this Article will use the term “carbon market” to refer to the CDM and the deals in this market.⁷⁴

In order to put the U.S. reaction to the carbon market in perspective, the following aspects are worth mentioning. If the United States’ efforts fall short and it is compelled to purchase make-up permits from the market, the United States has the option to buy the credits from other advanced nations. The carbon market transactions will only come into play if all the following conditions are met: (a) the number of tonnes reduced by all the domestic effort in the United States is added up, and (b) this sum, or the total number of tonnes reduced by the entire U.S. domestic sector, is less than the target set for the United States, then (c) the gap has to be bridged through market purchases, and (d) the United States chooses to purchase the credits from permits earned by China rather than from the United Kingdom or the Netherlands.⁷⁵ However, arithmetically, the United States does have a valid point—since advanced countries have binding targets, supply of excess permits from these nations may be less than the credits from China.⁷⁶

This brings us to the heart of U.S. objections to the Kyoto Protocol. China, as a Non-Annex I country, can sell its permits, and the United States fears that China will be the biggest beneficiary and recipient of U.S. money if the United States signs the Kyoto Protocol.⁷⁷ China accounts for more

74. “Carbon market” references in this Article explicitly exclude JI and IET.

75. See *infra* Parts III.A–B for list of countries that own a significant portfolio of credits.

76. For instance, China earned over 50 percent of the credits initially awarded, which is substantially more than countries such as Vietnam or Malaysia that account for 2–3 percent of the total carbon initiatives in the world. See *infra* Figures 4,5,6.

77. For example, legal scholarship has proceeded on the presumption that money will indeed flow into China if the U.S. ratifies the Protocol. Moral theorists, like Farber, argue the United States should still ratify the Protocol because it is morally responsible. Justice theorists, like Posner and Sunstein, argue that justice theory does not require the United States to participate, so long as China will unfairly

than 50 percent of the total permits that the United Nations has issued; a fact that further increases the United States' disquiet regarding the Kyoto Protocol.⁷⁸ The U.S. Senate summarized its objection as follows:

The Senate strongly believes that the [Kyoto Protocol] proposals under negotiation, because of the disparity of treatment between Annex I Parties and Developing Countries and the level of required emission reductions, could result in serious harm to the United States economy, including significant job loss, trade disadvantages, increased energy and consumer costs.⁷⁹

In order to parse out the U.S. objection, some carbon market context and background would be helpful. Hence, the following Part A will discuss the concept of a carbon credit, Part B will highlight the key features of the market and the types of initiatives that received credit in the U.N. market, and Part C will discuss the UNFCCC registry which provides a way to track the ownership and transfer of credits.

A. “Carbon Credit” – Concept and Background for the Study

In countries that have signed the Kyoto Protocol, the Executive Board issues “certificates” or “credits” or “carbon credits” for every tonne of greenhouse gas emissions that are reduced.⁸⁰ After the Executive Board

benefit at the expense of the United States. But the scholarship proceeds on the assumption that China will gain the moneys the United States pays to purchase credits to make up for its high emissions. For the Senate's opposition to the Protocol and cap and trade, see discussions on S. Res. 98, 105th Cong. (1997) (enacted), and the Energy Secretary's comments on the Senate rejecting the cap and trade bill in 2010, *supra* note 34.

78. China accounts for 50.26 percent or 2,161 projects as on July 9, 2012. See *infra* Figure 4. See also *infra* Figures 5 and 6 for updated statistics for the periods until Sep. 28, 2012, and Aug. 31, 2012, respectively. Figures 5 and 6 show the Chinese grip is unlikely to be relinquished anytime in the near future. However, it is also equally true (as shown in the Figures 4, 5, and 6), other developing countries have earned 50 percent of the credits to date; India and Brazil, for example, own substantial portfolios. Plausibly, the United States could purchase credits from these countries instead of China.

79. S. Res. 98, 105th Cong. (1997) (enacted). See also Wara, *supra* note 17, at 1797–98 (criticizing the Protocol's market; specifically, CDM for recognizing and awarding credits to projects with questionable environmental benefits).

80. As discussed in Part I, this Article will confine itself to Certified Emission Reductions (CERs) (or credits that were traded on the CDM platform) since these credits are the chief source of U.S. resistance to the Kyoto Protocol. However, a number of non-U.N. or optional offset systems (commonly known as “voluntary offsets”) also exist. Since the United States is not subject to mandatory caps, the few American firms that buy credits opt to buy voluntary offsets (and utilize it for marketing purposes). Companies buy CERs to meet mandatory targets under the Protocol, voluntary offsets or credits in contrast are optional. NICHOLAS LINACRE, ET AL., *supra* note 20, at 9 (estimates the CDM market accounts for 87 percent of the transactions from 2005–2010, which is valued at \$26.5 billion, and voluntary offsets account for the remaining 13 percent or \$4.1 billion in transactions.). Moreover, voluntary offsets are issued and regulated by non-U.N. or private bodies. As a practical measure, industrial activities that (a) do not fulfill the United Nations' rules or (b) are located in countries that are not party to the Convention (such as Turkey) obtain voluntary credits. A number of non-U.N. or private organizations issue voluntary credits (marking them as “Gold Standard,” etc.).

and multiple bodies scrutinize the activity, the Executive Board issues these carbon credit certificates. The predominant form of carbon credit certificates are Certified Emission Reductions (“CERs”). In principle, the Board provides one credit for every tonne of carbon dioxide reduced.⁸¹ Or, 1 CER = 1 credit = equivalent to 1 tonne of CO₂ reduced.⁸² The onus is on the party requesting the credit to prove that its initiatives fulfilled the various standards and conditions outlined below. Since the Protocol sets emission reduction targets for countries, countries that surpass or fall behind the agreed number can trade these credits on the UNFCCC’s trading platform; encouraging countries to increase their effort to curb rising emissions.

In keeping with industry parlance, this Article shall refer to various types of activities that are recognized by the Board and earning credits as “projects” or “industry” or “industrial activities.” For readers’ ease, this Article will focus on the industrial activities that earn credits and will draw on illustrations from the industrial sector.⁸³ Before turning to the UNFCCC registry and carbon market process in Part C, it is important to briefly acknowledge a possible criticism. Scholars point out that the market

81. The Kyoto Protocol covers not only carbon dioxide but also a “basket” of six greenhouse gases – methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆), in addition to carbon dioxide. See Danish, *supra* note 60, at 38 (“Each Annex I party’s commitment applies on the basis of a ‘basket’ of six GHGs . . . The Intergovernmental Panel on Climate Change has determined the global warming potential for each of these types of GHGs relative to carbon dioxide. Adopting this approach, the Protocol expresses each party’s limit in the form of a certain amount of ‘carbon dioxide equivalent’ tons of GHG emissions. In addition, for HFCs, PFCs, and SF₆, the Protocol allows the use of 1995 as a base year, which has the effect of easing the stringency of requirements for these GHGs because, for most countries, emissions of those GHGs were higher in 1995 than 1990.”); Wara, *supra* note 17, at 1766. For easy comparison, this Article will also similarly utilize carbon dioxide as the relevant unit.

82. *Fast Facts & Figures, UNFCCC*, http://unfccc.int/essential_background/basic_facts_figures/items/6246txt.php (last visited Dec. 26, 2013) (explaining the CO₂ equivalent concept as follows: “GHG emissions/removals can be expressed either in physical units (such as grams, tonnes, etc.) or in terms of CO₂ equivalent (grams CO₂ equivalent, tonnes CO₂ equivalent, etc.). The conversion factor from physical units to CO₂ equivalent is the Global Warming Potential (GWP) of the corresponding GHG. If X Gg of CH₄ is to be expressed in terms of CO₂ equivalent, then it is multiplied by 21, which is GWP of CH₄ over 100 years timescale.”).

83. To date, industrial activities like renewable energy power plants and energy efficiency improvements dominate the list. See Figure 2. For most recent trends in the technologies that were registered until Jan. 31, 2012, see *Trend of Types of Projects Registered and Registering*, CDM Insights, UNFCCC, <http://cdm.unfccc.int/Statistics/Public/files/201301/regtypenum.pdf> (last visited Dec. 26, 2013). However, it must be noted, the Board recognizes and issues credits for activities in different economic sectors, including transport afforestation though industrial activities currently earn the maximum number of credits. See Figure 2. The industrial sector may be dominant because the Protocol processes require the party to precisely estimate the carbon dioxide reduced by the activity and it is arguably more difficult to measure the tonnes of carbon dioxide reduced by trees than it is from metered power consuming factories.

recognizes and issues certificates to activities that do not really reduce emissions.⁸⁴ In support, they point to hydrofluorocarbon (“HFC”) projects, which earned credits even though HFC activities have dubious environmental effects.⁸⁵ But these critics ignore and fail to acknowledge that while HFCs may have received some credits, renewable energy and energy efficiency make up the lion’s share of the credits.⁸⁶ According to United Nations, renewable energy has consistently accounted for 60 percent of all carbon projects, and has risen to 80 percent more recently.⁸⁷

This survey is based on market observations, so, any criticism that certain type of projects, (such as HFCs discussed earlier) ought not to be provided credits does not affect the conclusions here.⁸⁸ Even if the criticism on types of projects is accepted, and projects that in the critics’ opinion ought not to have earned credits are eliminated, the percentage of credits sold forward will not change dramatically. In sum, this Article is unaffected by this potential criticism.

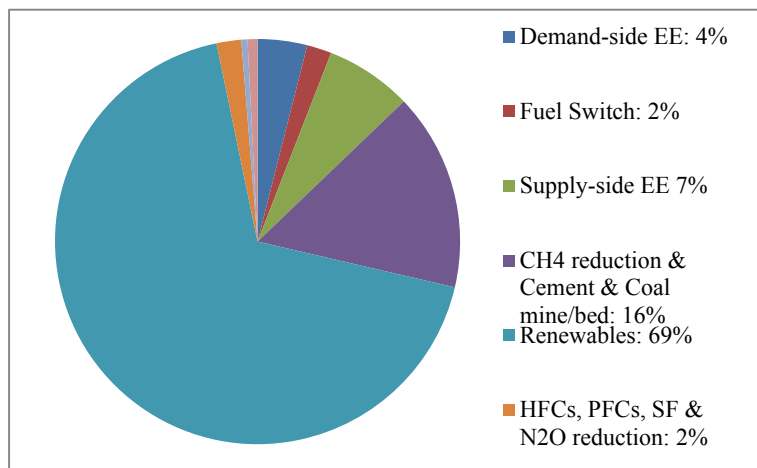
84. Wara, *supra* note 17, at 1797; Rosenthal & Lehren, *supra* note 5.

85. See, e.g., Wara, *supra* note 17, at 1779–80 (explaining that adipic acid and chlorodifluoromethane industries, which have bad environmental impacts, have earned a large number of credits). “The very large projects dominating the supply of CERs are confined primarily to two relatively obscure industries—adipic acid and chlorodifluoromethane (HCFC-22) production. Adipic acid is the feedstock for the production of nylon-66 and releases abundant N₂O as a production byproduct. HCFC-22 has two major applications. It is one of two major refrigerants that was phased in to replace the CFC’s under the auspices of the Montreal Protocol to Protect on Substances that Deplete the Ozone Layer. HCFC-22 is also the primary feedstock in the production of PTFE, more commonly known by its Dupont brand name, Teflon. HCFC- 22 production inevitably produces HFC-23 as an unwanted byproduct. These two relatively small industries represent nearly 55 percent of the supply of issued CERs in the CDM to date.” *Id.* at 1778–79. See generally Rosenthal & Lehren, *supra* note 5.

86. See *infra* Figure 2; UNEP Risø Centre, *CDM Projects by Type*, UNEP RISØ CDM/JI PIPELINES DATABASE AND ANALYSIS, Feb.1, 2013.

87. See *UNEP Risø CDM/JI Pipelines Analysis and Database: CDM Projects by Type*, UNEP RISØ CENTRE, <http://www.cdmpipeline.org/cdm-projects-type.htm> (last updated Dec. 1, 2013) (Number (%) of CDM Projects In Each Category of Types).

88. See *infra* Parts III.B.2–3.

FIGURE 2: Types of Activities⁸⁹

B. Powers of Attorney and Project Stages

The Protocol awards one credit for every tonne of carbon dioxide reduced. Per the market rules, the party requesting the credits: (a) completes a number of steps, and (b) submits a full set of documents. Furthermore, the Board, national agencies, and independent technical experts scrutinize the documents submitted. It is only after all these bodies approve the project that the Board awards credits.⁹⁰ While passing AB 32 creating its cap and trade scheme, California adopted similar procedures including scrutiny by independent technical experts and multiple organizations. Hence, the Protocol's procedures are relevant to domestic U.S. regulation too.⁹¹

Moreover, the Board has created an online Registry that discloses various documents that parties file (describing the project, technology that will be used, location, estimate of tonnes of emissions anticipated to be reduced), the approvals, and the decisions received from the technical

89. See UNEP RISO CENTRE, *supra* note 87. The data included in this graph adds up to 101.3 percent. Since this graph is extracted from the UN website, the author retained it without amendment.

90. See, e.g., Anand, *supra* note 69 ("CDM aims at high credibility through requiring approvals from national governments, the UN and designated operational entities (DOEs). They are chosen for technical expertise and of high standing, such as Deloitte's TECO, DNV, etc, [sic] and provide final checks, verifying and certifying reductions."); Aarthi S. Anand, *Will India Capitalise on Cancun Gains?*, NEW INDIAN EXPRESS, Jan. 28, 2011, at 11 ("The UNFCCC process provided for strong roles for independent third party agencies, a singular achievement. Third party agencies (or Designated Operational Entities) are involved at every stage, from initial verification, determining technology and project eligibility to final approval prior to credit issuance.")

91. See Cart, *supra* note 35.

agencies.⁹² Parties also lodge the powers of attorney with regard to the carbon credits at this Registry, providing a rich source of data to check who owns these credits and whether the numbers support the China argument.

The following Part B will explain how the dataset was collated. Part B.1. shall explain how the UNFCCC maintains a Registry that contains powers of attorney forms, which enables us to track ownership and sale of credits. Part B.2. will briefly explain the crediting cycle and various milestones that must be achieved before a credit is issued—this context is necessary to understand the analysis in Part III.

Part B.2. will provide one additional benefit—when describing the crediting steps, it will highlight the documentary and approval mechanisms that the Protocol establishes in order to ensure integrity in the market. This is important because it addresses the main charge that critics levy against carbon trading. Commentators often chastise the existing system, and raise doubts on whether there are sufficient checks to verify the project details provided by owners, or to assess and calculate the number of credits that should be awarded.⁹³ And so, this Part will shed light on the documents and multiple tiers of permissions that the Protocol insists upon, which enhance the transparency and integrity of the carbon markets – an aspect underemphasized in current literature.⁹⁴

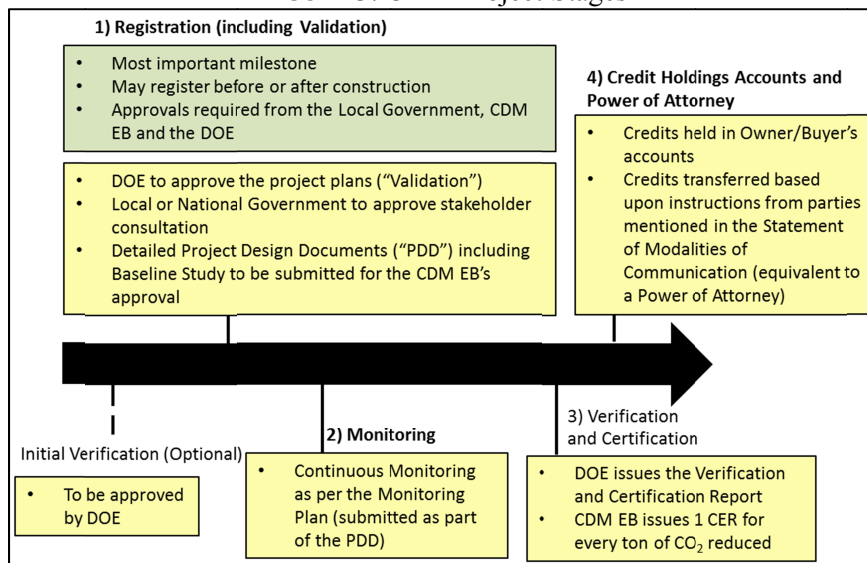
Figure 3 below provides a bird's eye-view of the crediting stages. Phases (1) Registry and (4) Powers of Attorney are most relevant to understand the analysis later in Part III, and so, Part B.1. will focus on these phases. The following Part B.2. will examine the other project phases, documents and agencies' approvals; background pertinent to this Article.

92. For forms describing the project that must be completed in order to earn credits, see *Rules and Reference: CDM Forms*, UNFCCC, http://cdm.unfccc.int/Reference/PDDs_Forms/index.html (last visited Dec. 26, 2013).

93. See, e.g., Wara, *supra* note 17, at 1803 (pointing out that market participants often act strategically to generate credits for activities that have no merit); Rosenthal & Lehen, *supra* note 5.

94. The Kyoto Protocol rules create various checks and processes to bolster integrity in the carbon market, which formed the basis for an earlier talk. Aarthi S. Anand, Remarks at Transparency International's 14th Annual Anti-Corruption Conference: Getting Carbon Market Governance Right from Day One (Nov. 12, 2010). A few experts disapprove of the complex system and the higher transaction costs it creates. See, e.g., NICHOLAS LINACRE ET AL., *supra* note 20, at 41 (describing disruption, bureaucracy, and controversy in carbon markets in 2010); McNish, *supra* note 17, at 391; INT'L EMISSIONS TRADING ASS'N, STATE OF THE CDM 2009: REFORMING THE PRESENT AND PREPARING FOR THE FUTURE 3–4 (2009), available at http://www.ieta.org/index.php?option=com_content&view=article&id=77%3Astate-of-the-cdm-2009&catid=27%3Aarchived-reports&Itemid=93.

FIGURE 3: CDM Project Stages



1. *Registered Powers of Attorney.* Similar to local laws that require firms to file building plans, carbon rules insist industries submit documents detailing the activity for which credits are claimed ("registration documents" or "project documents").⁹⁵ The various types of information and documents needed for registration, as well as the approvals and phases before credits are issued, shall be described in Part I.B.2. Notably, the Kyoto Protocol establishes the carbon market and Board, and also empowers the latter to set-up, operate and maintain a Registry ("Registry").⁹⁶ The Registry records all activities that earn credits and discloses the complete set of documents on the UNFCCC website (including the documents the parties submit for registration, independent experts' audit reports etc.).⁹⁷

Owners draw up powers of attorney in favor of either an employee or a buyer (if credits are presold), and these instruments are lodged with the

95. The technical term for these documents is "Project Design Documents," or "PDD." PDDs provide a brief description of the proposed activity – for instance, a renewable energy plant of a certain size (or megawatt) is being built instead of a coal power project, along with some technical information. For more details on the types of documents, see *infra* note 98.

96. Kyoto Protocol, *supra* note 4, at art. 12.

97. The Registry performs the following functions: (a) records all the projects registered so far; (b) discloses the data on all the projects, including all the project documents, agencies' validation and verification report reports. See *infra* Part I.B.2 for more information on the documents, and approvals that are required at various stages of the accreditation cycle.

Registry.⁹⁸ The Board accepts powers of attorney in a specific format.⁹⁹ This form names: (a) the party with the right to transfer the credits (the buyer), and (b) party authorized to communicate with regard to the project.¹⁰⁰ Since the first right or power to authorize the transfer of credits is the most important power tied to title, this data-point is the principal focus of this study.

Notably, this form can be filed very early. Experienced carbon traders and buyers insist that sellers sign and deposit this form with the Registry.¹⁰¹ This power of attorney provides buyers signing a forward contract the most legally secure mechanism to lock in the sellers.

Remarkably, this Article is the first initiative to comb through the Registry and the legal instruments to track the sale of credits. The following Part B.2. will include a brief synopsis of the crediting cycle to provide context for the empirical analysis in Part III.

2. *Project Phases.* In the carbon project cycle, registration is the most important milestone. In order to succeed in registering their projects (to earn credits), owners must furnish documentary proof describing the project, and justify on what basis they claim the activity will reduce emissions, and provide clear figures to support their claim. Moreover, as shall be described below, a number of national, UN bodies and third party agencies must be convinced by the party's claim before the project will be registered. Because of the detailed scrutiny involved, conceivably, clearing

98. This form is called a Statement of the Modalities of Communication or simply, the Modalities of Communication. For the latest sample form, see *Modalities of Communication Form (Version 02.1)*, CDM REGISTRY, UNFCCC (Mar. 16, 2012), available at http://cdm.unfccc.int/Reference/PDDs_Forms/Registration/reg_form19.pdf.

99. *Id.*

100. The three types of powers that can be granted to a third party are as follows:

“(a) Communicate in relation to requests for forwarding of CER

(b) Communicate in relation to requests for addition and/or voluntary withdrawal of project participants and focal points, as well as changes to company names, legal status, contact details and specimen signatures

(c) Communicate on all other project or programme related matters not covered by (a) or (b) above.” *Id.* at 1..

101. Savvy traders include clauses to this effect in the purchase agreement, including as a condition precedent for the contract. Telephone Interview with a member of senior management and the negotiating team at one of the prominent international carbon trading firms (Feb. 05, 2013) [hereinafter Interview with Carbon Trader]. See also E-mail Interview with Paul Curnow, Partner, Baker & McKenzie (Feb. 18, 2013) (“Generally, (and this practice continues till date), Annex I Buyers [developed countries] insist on being named as the focal point in the Modalities of Communication, with the rights delegated from the seller (and any other project participants) to instruct the Board in relation to the forwarding of credits from the project. Historically, Chinese sellers have been prepared to give sole delegated authority, or full authority to instruct the Board with regard to issuing and distributing the credits.”).

this hurdle provides a good signal on whether the project will ultimately earn credits.¹⁰² Though there is some flexibility on when parties need to register their projects (either before or shortly after putting up the plant), most parties choose to register early.¹⁰³

First, the party seeking the credits must furnish detailed documentation. The firm submits detailed documents substantiating its claim to receive credits, including an estimate of the emissions that will be avoided.¹⁰⁴ For example, a corporation that constructs a 20-megawatt solar power project will submit an estimate of the emissions that would result if a coal plant is built to generate equivalent energy.¹⁰⁵ The difference in emissions between the potential coal plant and the actual solar plant built will be treated as the project's estimated emission reductions.¹⁰⁶ The firm receives one credit for every metric tonne of carbon dioxide emissions displaced.¹⁰⁷ The party will

102. *CDM Project Cycle*, UNFCCC, <http://cdm.unfccc.int/Projects/diagram.html> (last visited Dec. 26, 2013). See United Nations Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol on its First Session, Montreal, Can., Nov. 28–Dec. 10, 2005, *Action Taken by the Conference of the Parties Serving as the Meeting of the Parties*, U.N. Doc. FCCC/KP/CMP/2005/8/Add.1., Addendum, Part II (Mar. 30, 2006). The party initiates the registration process by submitting Project Design Documents and supporting documents to the third party entity appointed for validation. A vast majority of projects that are deemed ineligible and rejected by the Executive Board are refused at this stage. In short, this phase poses the biggest hurdle for a project to secure credits. Interview with Carbon Trader, *supra* note 101.

103. Parties may apply before or shortly after construction. However, the Kyoto Protocol excludes past projects or those already constructed. The additionality condition excludes prior projects. See Kyoto Protocol, *supra* note 4, Art. 12 para. 5(c); *What is Additionality?*, CDM RULEBOOK, BAKER & MCKENZIE, <http://cdmrulebook.org/84> (last visited Dec. 26, 2013). Moreover, as carbon experts confirm, “seeking early registration prior to construction was (and still is) the common market practice. Indeed, emission reduction purchase agreements are typically structured on a conditional basis – with explicit conditions precedent involving certain milestones being achieved before the credit sale and purchase obligation becomes legally effective, or before any advance payment would be made. The most significant milestone used is achieving registration. Several additional milestones spread out over the validation and registration cycle (getting the Annex I and Host Country approval letters) give buyers flexibility in being able to terminate and exit the agreement if projects were not ultimately successful in obtaining registration.” Interview with Paul Curnow, *supra* note 101.

104. The party submits an estimate of the emissions reduced by the project. In order to estimate the same, the party shows a scenario reasonably representing the anthropogenic greenhouse gas emissions that will occur in the absence of the project (“Baseline”). Utilizing this Baseline, the party calculates and submits an estimate of the emissions that will be reduced by the project (“Baseline Study”).

105. For the purpose of this discussion, an over-simplified illustration (that omitted the complex set of factors used by the Board) is provided. For an elaborate discussion on Baseline processes, see McNish, *supra* note 17, at 404–05.

106. However, final certificates are issued after verifying the details of the actual plant built and units of power consumed, an additional safeguard included by the market rules. See also *infra* note 142 and accompanying text (discussing Post-Registration Phases). Some scholars argue parties manipulated the system by producing false baselines. See, e.g., Wara, *supra* note 17, at 1781–85. Since this Article analyzes *deals in the marketplace*, and does not base any conclusion on the types of projects, any criticism leveled against the types of projects do not affect this study. Moreover, the results of this survey will show little change even if these criticized projects are excluded.

107. For readers' ease, this example is evidently over-simplified. In practice, the Board's decisions

include a monitoring plan describing the procedures that will be undertaken during the project's lifetime.¹⁰⁸ Second, the documents must be examined and approved by the following three groups: (i) a technical organization belonging to the select list maintained by the United Nations ("independent technical firm or expert")¹⁰⁹ to validate the documents;¹¹⁰ (ii) local or national government authorities who confirm that the party has complied with and held a stakeholder consultation as per local norms; and (iii) even after these approvals are obtained, the Board retains full discretion to decide whether or not to register the project. In short, a project is registered only after all these bodies decide that the proposed activity will result in reducing emissions.¹¹¹ Moreover, parties continue to monitor the project and independent experts conduct final audits before the Board issues credits.

Third, the activity has to be verified and certified. For the carbon project's lifetime, the industrial corporation collects data and continues to monitor the project, as per the plan the Board approved at the time of

have created a body of rulings and precedent to calculate the tonnes of emissions displaced. This general rule, however, suffices for the purpose of this Article.

108. This party adheres to the monitoring plan during the project lifetime, which will be verified. For a discussion on the verification and certification phases, see *infra* note 142 and accompanying text.

109. The technical term for these agencies is "Designated Operational Entities." These agencies audit the project at two stages: (1) initial document scrutiny – a process called validation, which is necessary for, and conducted prior to registration; and (2) final verification. This Article will generally refer to them as "agencies." Occasionally when the context so requires, these agencies shall be referred to specifically, as "validation agencies" or "verification agencies." Both validation and verification agencies are drawn from the same list of accredited agencies maintained by the United Nations. Parties have the option to hire different validation and verification agencies. *List of DOEs*, UNFCCC, <http://cdm.unfccc.int/DOE/list/index.html> (last visited Dec. 26, 2013).

110. These agencies have the power to reject the project if, in the agency's opinion, the project fails to meet certain standards. This stage is called "validation" and is conducted as follows: (a) The industry owner engages one of the agencies. (b) The owner then asks the agency to submit a request ("validation report") to the Board to register the project. (c) The agency possesses the power to decide whether or not the project meets certain standards. (d) Optional initial verification - The industrial corporation at its discretion, could also request the agency to *in limine* determine whether the project fulfills the criteria required at later stages. Essentially, the agency determines whether the steps for final verification (needed to issue credits) are in place. For instance, whether the monitoring plan approved for data collection and management system is in place for successful verification and certification. While this initial verification report is not conclusive, it provides early warning. Conceivably, this may be in effect for the Chinese projects analyzed here. Carbon credit traders frequently develop the project and also accept project risks. Hence, buyers often include a clause insisting on initial verification report as a condition precedent in transaction documents; providing grounds to terminate the forward purchase obligation, if the third party verification agency provides a negative finding. See *generally* THE GOLD STANDARD, VALIDATION & VERIFICATION MANUAL FOR CDM PROJECTS (2006), available at <http://www.cdmgoldstandard.org/wp-content/uploads/2011/11/GS-VVM-CER.pdf>.

111. The Board accepts and registers the project (or requires revisions to the document) or rejects it as ineligible for credits. If the Board approves a revised Project Design Document re-submitted by the owner, the revised one is treated as the PDD for all accreditation purposes.

registration.¹¹² Once the power project is running, the industrial corporation will hire an independent technical firm to verify the emissions reduced.¹¹³ The independent technical firms frequently conduct site visits to measure the emissions reduced by the plant.¹¹⁴ The actual plant constructed determines the number of credits that are receivable, and supersedes estimates submitted at the time of registration.¹¹⁵ Upon receiving the technical expert's final verification and certification reports, the Board will credit an equivalent number of credits into the owner's account.¹¹⁶

Fourth, after the credits are issued, they are held in and bought and sold through credit accounts established and maintained by the Board. When credits are traded, they are essentially transferred from sellers' to buyers' accounts. Sellers lodge powers of attorney in favor of buyers, as earlier discussed in Part I. The Board only accepts instructions to transfer credits from entities named in the power of attorney forms deposited by sellers.

All powers of attorney are a matter of public record and available on the Registry website. The following Part III will shed light on the distribution of credits issued so far; particularly, Chinese entities earned a

112. This plan is called "Monitoring Plan." The Board's permission is required for the entire set of registration documents including the Monitoring Plan (and any revisions to it). In practice, changes to the approved plan are discouraged. The agency scrutinizes the project far more closely at the next stage, when verifying the project, if the party amends the plan.

113. Regarding the method utilized to estimate the final number of credits, the following two clarifications are important. One, the number of credits finally issued will depend upon the *actual* project constructed (and not merely the estimate submitted at the time of registration). See illustration discussed *infra* note 115. Two, the final number will be calculated as follows. The agency measures the actual number of units of energy produced (by say, the solar power plant) ("*a*"). The agency then utilizes the figures approved in the Baseline Study, i.e., the emissions that would have resulted if coal power is utilized to produce equal units of energy ("*b*"). The difference between the above two numbers will be utilized to calculate the number of credits: emissions reduced = $b - a$.

114. Also called "verification report" and "certification report," respectively. See also Anand, *supra* note 69 ("The annual emission reduction claim made by the owner will be verified by a designated third-party prior to credit issuance.").

115. Illustration: The firm may have planned to construct a 50-megawatt solar plant but finally built a 20-megawatt plant. In that case, the party will earn credits for the 20-megawatt plant that is finally constructed.

116. Parties (and the Executive Board) determine the frequency and timing when third-party agencies are hired to verify and certify the credits, based on project size and economic considerations, on a quarterly, semi-annual or annual basis. Industrial corporations often prefer to outsource the carbon development work to carbon specialists (or traders). These traders engage agencies on a retainer basis and so are able to quickly complete verification and obtain credits. Interview with Carbon Trader, *supra* note 101. This business advantage may be criticized, but has hitherto not been noticed by scholars or the general press. Moreover, as a carbon expert points out: "[v]erification and certification can only be carried out on an ex-post-basis, i.e., the registered project must demonstrate it has achieved historical emission reduction over a specific period. Earlier, it was expected verification and certification will be carried out quarterly or bi-annually. However, *due to the higher-than-expected costs and bottle-necks* due to the ongoing formulation of the verification rules, and shortage of qualified Designated Operational Entities, today it is *most common for projects to undertake verification every 12 months*, and in many cases, it only occurs every 18 months." See *id.* (emphasis added).

vast majority of these credits, which the data reveals they have sold to European and Japanese corporations.

III. THE CHINA ARGUMENT – FACT OR MYTH?

The United States fears it will be compelled to purchase credits from China, which possesses the largest store of credits, resulting in vast sums of U.S. money being transferred to China.¹¹⁷ Motivated by the China argument, the United States opposes the Kyoto Protocol.¹¹⁸ But, does the United States' China myth have any basis in fact? Or, is it the proverbial Loch Ness monster?

This Article tests this hypothesis. The United States dreads entry into the emission market because it believes China owns the vast majority of credits—half the worldwide projects that generated these credits.¹¹⁹ This empirical survey demonstrates that though China has generated a vast number of credits, it has since alienated its stake. Indeed, China has already sold and no longer owns nearly 90 percent or more of its portfolio.¹²⁰ As a result, the United States' misgiving that it will be compelled to buy credits from and transfer enormous wealth to China, is plainly incorrect.

Toward this end, Part A will provide a snapshot of the total global projects and China's projects (which account for 50 percent, or more than 2,000 projects).

Part B will form the bulk of the analysis, and examine all the Chinese projects, without any exclusion or selection bias. Specifically, this study will examine the powers of attorney forms for all the Chinese projects to check how many credits does China truly own. Has China already sold most of its credits to foreign buyers? The raw data essentially tells the story – credits from nearly 90 percent of Chinese projects have been transferred to entities in advanced countries.¹²¹ Moreover, for 4 percent of the projects no power of attorney forms were filed with the Registry for us to authoritatively determine whether these credits were sold early or not. And so, the percentage of credits remaining in Chinese hands is marginal.¹²² Effectively, China no longer owns the credits. Thus, if the United States joins the market and purchases credits on the secondary market, this money will flow to London, Zurich, Amsterdam or Tokyo—not Beijing.¹²³ At this

117. See *supra* Introduction, Part I.A.

118. See S. Res. 98, 105th Cong. (1997) (enacted); Posner & Sunstein, *supra* note 3, at 1600.

119. See *supra* Figure 3; *infra* Figure 4.

120. See *infra* Figure 7.

121. *Id.*

122. *Id.*

123. See also discussion in *infra* note 154.

stage, a possible objection may have risen in the reader's mind - If China's portfolio had been acquired by European and Japanese traders, does it mean vast sums of cash will now flow from the United States to Europe and Japan? This Article examines whether the China argument that is impeding American support of the Kyoto Protocol is accurate. Whether Europe will benefit from U.S. entry into the Protocol market is beyond the confines of this Article. However, it is worth noticing that U.S. firms such as Goldman Sachs and Honeywell, as also the D.C. based World Bank have acquired significant carbon portfolios from China, Latin America, suggesting net capital outflow from the United States may be less than anticipated.¹²⁴ Therefore, Part B will include a description of the methodology used to collate the data, the results as well as answer potential objections that may be raised regarding this study.

A. *China's Share of the Global Market*

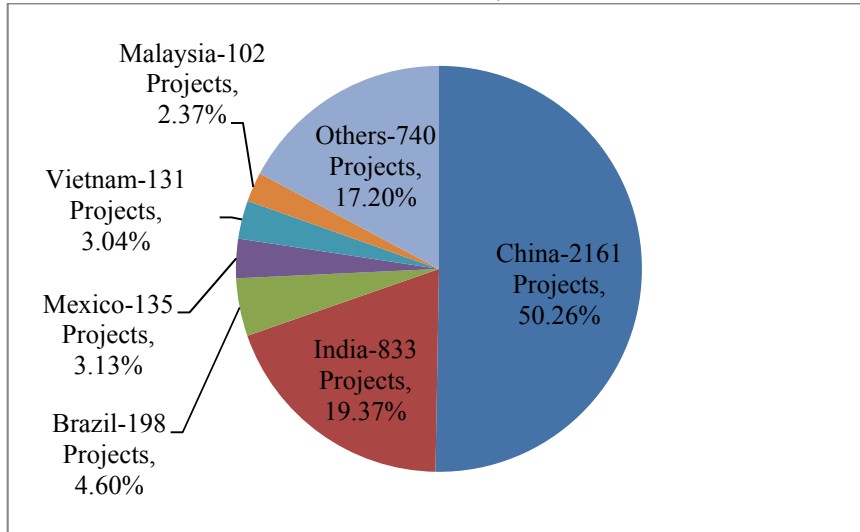
Per UNFCCC's data released on July 9, 2012, over 4,300 projects have been registered.¹²⁵ Of these, as shown in Figure 4, China earned the biggest share of credits initially awarded, accounting for fifty percent (or more precisely, 50.25 percent or 2,161) of total global projects. India places a distant second at twenty percent.¹²⁶ For uniformity and accurate analysis, this Article will analyze the same sample.

124. See sources cited *supra* note 28.

125. *CDM Statistics*, UNFCCC (Aug. 9, 2012), <http://cdm.unfccc.int/Statistics/Registration/NumOfRegisteredProjByHostPartiesPieChart.html>. As per the most recent data released by the UNFCCC, there are 7,400 projects registered, and China continues to be the leader. See *Distribution of Registered Projects by Host Parties*, UNFCCC (Dec. 31, 2013), <http://cdm.unfccc.int/Statistics/Public/CDMinsights/index.html>; *Trends of Projects Registered and Being Registered by Host Party*, UNFCCC (Dec. 31, 2013) <http://cdm.unfccc.int/Statistics/Public/files/201312/reghpnum.pdf>. In short, these figure reinforce and do not detract from the analysis in this Article.

126. See Figure 6.

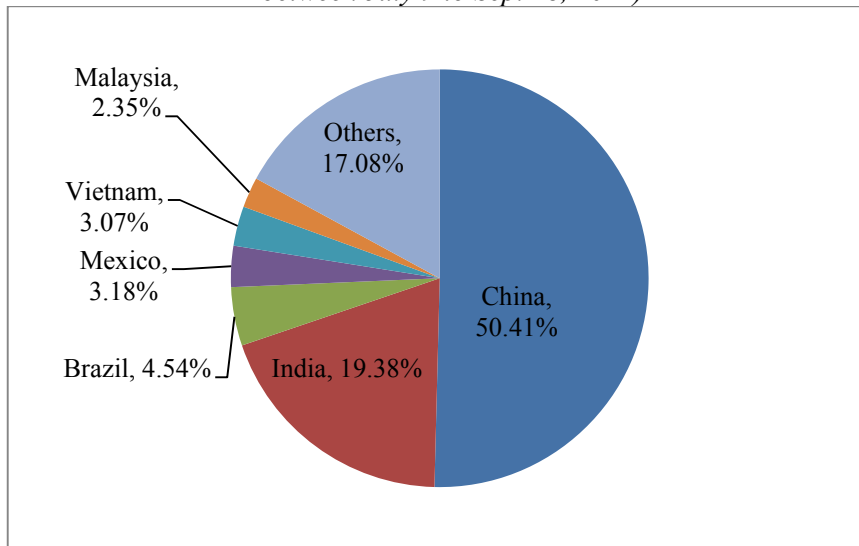
FIGURE 4: Worldwide Projects - Data Released on July 9, 2012¹²⁷
Total Number 4,300



Given that China has such a huge lead in the number of projects registered to date, it is unlikely that this advantage could possibly be diluted in a short time (or the period after July 2012). Yet it may be contended that this study's cut-off date skews the analysis because China's share is disproportionately high in this period (with other countries' shares increasing in subsequent months). If, however, China's market share fell in the period after the cut-off date, it could affect the conclusions. This is easily disproved. Figure 5, which represents the UNFCCC data released on September 28, 2012, demonstrates that there is only a negligible change in China's market-share in the period from July 9 to September 28, 2012. Indeed, China's share increased by .2 percent and no country's share changes by even a percentage point (as documented in Figures 4 and 5).

127. UNFCCC, *supra* note 125.

FIGURE 5: Worldwide Projects – Data Released on Sep. 28, 2012¹²⁸
 Total Number 4,690 (included an additional 390 projects registered
 between July 9 to Sep. 28, 2012)



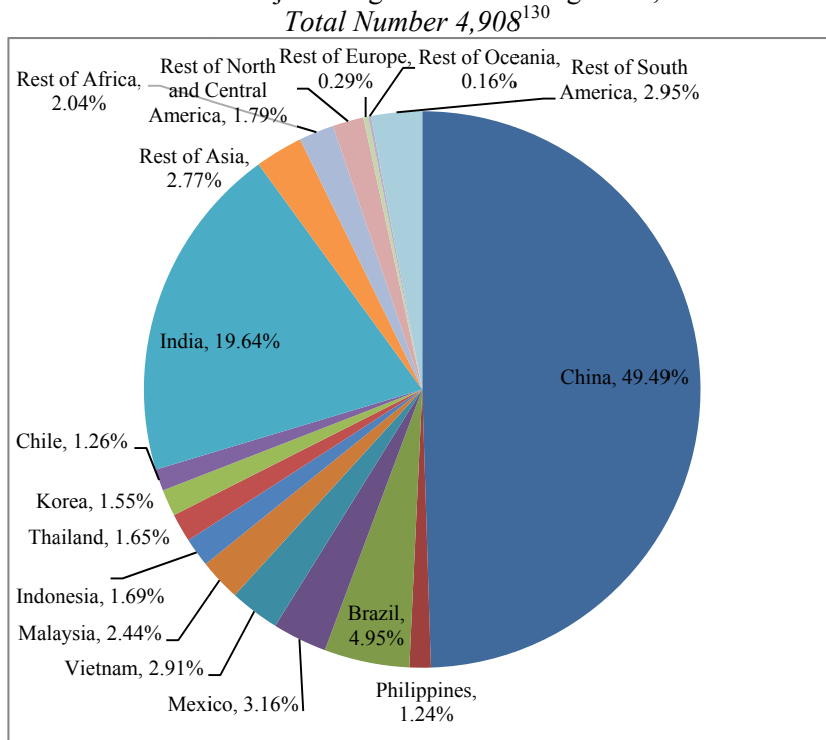
This study also independently verified the UNFCCC's numbers on Figures 4 and 5. Not merely relying on the charts released by the Board, this survey checked the full list of registered projects and confirmed the number of projects hosted by various countries.¹²⁹ In other words, all the projects listed on the Registry's website were scrutinized to vouch for the number of projects registered by China (and other nations). Figure 6 was prepared using projects registered until August 31, 2012 and supports the finding that there is scarcely any change in China's total market share.

This study further breaks down the country data to include nations that contribute as little as 1 percent. A complete list of countries and the number of projects each country has registered has been included in Figures 6A and Appendix 1. In contrast, the Board's data (Figures 4 and 5) identifies the six nations earning the most credits, and combines all other nations under the generic category "others." A further analysis of whether smaller countries also display sales pattern similar to China shall be left for future work.

128. UNFCCC, *supra* note 125.

129. Special thanks to Jonathan Waisnor for diligently checking and profiling this data.

FIGURE 6: Projects Registered until August 31, 2012

FIGURE 6A: Detailed Data for Countries Listed in Figure 6
(Total Number of Projects – 4,908 as of Aug. 31, 2012)

Host Nation	Percentage *	Number of Projects
China	49.49%	2429
India	19.64%	964
Brazil	4.95%	243
Mexico	3.16%	155
Rest of South America**	2.95%	145

130. This study includes the projects registered until and including Aug. 31, 2012. At first glance, it may appear as though there is a discrepancy between this total (4,908) and Figure 5 (4,690 as on Sep. 28, 2012). This may be easily explained. Sep. 28, 2012 is not the cut-off date used to create the chart but is the date the Board released the chart. As a result, Figure 6 above includes a few more projects registered (registered until Aug. 31, 2012). Nothing in the dataset shows any mistakes in the Board's data (Figure 5). Figure 6 is not intended to correct the Board's data as represented in Figure 5. "Rest of Europe" and "Rest of Oceania," contribute *less than 1 percent* and so, the information is listed as *number of projects* rather than in percentage. See Figure 6.

Vietnam	2.91%	143
Rest of Asia**	2.77%	136
Malaysia	2.44%	120
Rest of Africa**	2.04%	100
Rest of North and Central America**	1.79%	88
Indonesia	1.69%	83
Thailand	1.65%	81
Republic of Korea	1.55%	76
Chile	1.26%	62
Philippines	1.24%	61
Rest of Europe**	0.29%	14
Rest of Oceania**	0.16%	8

** Percentage of the total number of projects, 4,908.

* See Appendix 1 for the complete list of countries combined together as “Rest” of South America, Asia, Africa in Figure 6A.

The following Part B will study the documents registered in relation to Chinese projects, which account for the majority of global projects. There will be no internal selection—the entire China portfolio will be examined. Specifically, the powers of attorney submitted for all 2,000+ Chinese projects were checked, to determine the percentage of projects China continues to own. If any other nation(s) buys and now owns a significant portion of the credits that China initially earned, *ipso facto*, that country (and not China) will receive U.S. money, if the U.S. accedes to the Kyoto Protocol. Our analysis in the following Part B, thus, goes to the heart of U.S. consternation and cold feet with regard to a binding emissions treaty.

B. Who Owns China’s Credits?

Globally, China has earned the most number of carbon credits initially awarded as discussed in detail in Part A. However, an overwhelming majority of Chinese projects owners sold their credits to corporations in advanced nations. Corporations based outside China have acquired credits from 90 percent of the Chinese projects; in fact, the Board’s records reveal that most Chinese corporations transferred the credits very early on in their project cycles, even before credits were issued.¹³¹ These advanced nation

131. See *infra* Figure 7. Note, power of attorney forms must be submitted to the Board only if the Chinese owner sells the credits before they are generated or issued. In the case of China, as shown in *infra* Figure 7, for a vast majority (close to 90 percent), the forms were filed by owners; *ipso facto* demonstrating the credits were sold before the Registry issued certificates. For a discussion on owners registering the carbon component of the project even before the main plant is constructed, and traders’ observations that Chinese owners sell their credits early, see *supra* Part II.C.2.

buyers own title to these credits and if any subsequent sales occur, payments will flow to these corporations and not into China. Similarly, if as a result of the United States' opposition to the Kyoto Protocol, the cap and trade market loses steam, traders in the industrialized world rather than Chinese industry will suffer loss.

Part B.1. will outline the methodology, and Part B.2. will explain the results of this study. One possible criticism of the methodology and results in Part B.2. could be that this study focuses solely on powers of attorney. For instance, it may be pointed out, in addition to powers of attorney holders, the Registry also records "project participants." Project participants are parties and nations that may have an ownership stake in the credits, albeit in lesser quantities. On that basis, the following counter-argument may arise: What if an analysis of project participants reveals different results and the vast majority are Chinese entities? Part B.3. preempts this potential objection and studies the project participants data-point. The project participants' data corroborate and further strengthen the conclusion that China sold its credits. Part B.3. provides a method to double-check the empirical results in Part B.2., and Part B.4. answers other potential objections that may be leveled against the survey.

1. *Methodology.* The following methodology was employed to calculate and deduce the empirical results. First, this study utilized the same sample as the Board, which showed approximately 2,100 projects were registered before July 2012 (see Figure 4). This survey included 2,168 projects, 7 more than the 2,161 projects in the Board's release.¹³² Second, the powers of attorney for all the 2,161 projects are included in the study.

Third, this investigation focuses on the power to instruct the Board to transfer the credits. As per carbon rules, the Board has a specific power of attorney form with regard to credits,¹³³ which allows for three different powers to be transferred.¹³⁴ The most important power involves "the authority to instruct the secretariat and communicate with the Clean Development Mechanism's Executive Board on the allocation and forwarding of CERs."¹³⁵ This provision is easily the critical one, a signal of

132. This study utilizes July 7, 2012 rather than July 9, 2012. At a quick glance, it may appear strange that this survey yields a greater number of projects registered by July 7 than the number released by the Board on July 9, 2012. However, the data in Figure 4 was *released* on July 7; this is not the cut-off date for the Board's numbers. This explains why Figure 7 presents 2,168 Chinese projects whereas Figure 4 reflects 2,161 Chinese projects.

133. See CDM REGISTRY, UNFCCC, *supra* note 98

134. See *supra* note 100 for discussion on the three types of powers that can be transferred through the carbon market's power of attorney form.

135. This is the text found in the majority of forms reviewed in this study. However, the Board periodically modifies the form. For most recent language (with minor amendment in text) approved by

ownership or title transfer, and so, the review focuses on this entry. To avoid confusing transfers of title and ownership interests tracked in this study with less relevant powers such as to merely be copied on communication, this examination excludes the latter.¹³⁶ For instance, contractors assisting the firm with developing its carbon project may be copied on communication. In which case, the project owner will include an entry in the form (to the Board) specifying the name and details of any other firm (other than the owner) who ought to be copied on communication. This permission is significantly different from ownership and the power to transfer credits. This review excludes these ancillary permissions included in the form to avoid muddling the primary conclusion. In short, eliminating other entries in the form, which are not clear indicators of ownership, ensures the survey is more accurate.

Fourth, the form allows for the power of attorney to be “sole,”¹³⁷ “shared”¹³⁸ or “joint,”¹³⁹ and the survey employs the following methodology.¹⁴⁰ When a buyer had the sole right to provide instructions, it was assigned a 1. When a buyer had joint or shared rights with another buyer, each buyer was assigned a .50. The vast majority of the forms granted either “sole” or “joint” right to instruct the Board regarding the transfer of credits.¹⁴¹

the Board see *supra* note 100. See also CDM REGISTRY, UNFCCC, *supra* note 98 for the Board’s official template. The Modalities of Communication is the approved form issued by the Board. In this form, participants indicate whether that focal point(s) has sole (or shared) delegated authority with respect to the distribution and forwarding of CERs. Interview with Paul Curnow, *supra* note 101.

136. The excluded provisions are: “(i) authority to add, delete or withdraw Project Participants,” and “(iii) communication, and to be copied on communication with the Board (and secretariat).” See also CDM REGISTRY, UNFCCC, *supra* note 98.

137. “**Sole Focal Point authority** - A signature of an authorised signatory of ONLY the entity listed below is required for communication related to the corresponding scope of authority.” CDM REGISTRY, UNFCCC, *supra* note 98, at 1. Section II. Annex I parties (advanced nations) buying credits from China typically insist sellers authorize buyers as the sole Focal Point. Occasionally, Chinese sellers insist on being joint focal point, in which case the buyers include clauses insisting the seller will agree to sign any request for distribution of credits as submitted the buyer. See Interview with Paul Curnow, *supra* note 101.

138. “**Shared Focal Point authority** - A signature of an authorised signatory of ANY of the entities listed below is required for communication related to the corresponding scope of authority.” CDM REGISTRY, UNFCCC, *supra* note 98, at 1.

139. “**Joint Focal Point authority** - A signature of an authorised signatory of ALL entities listed below are required for communication related to the corresponding scope of authority.” *Id.*

140. There has been no known litigation or public dispute with regard to these forms, such as how the Board would interpret notice rules for receiving instructions (in case more than one party claims the credits through two parties named in the original power of attorney). And so, this Article will not speculate on possible disputes and outcomes that have not arisen in the real world.

141. For complete list of the corporate groups and entities in whose favor the powers of attorney are drawn, whether sole, shared or joint, see *infra* Appendix 2.

Fifth, if parties submitted revised forms, the study included the most recent ones. For instance, Chinese Seller A sold the credits to Carbon Trader B, who subsequently sold them to Investment Bank C. If the sale occurs early, *before credits are issued*, then Bank C will ask Seller A to file a revised power of attorney in favor of Bank C. In this case, this study would have identified Bank C as the buyer. However, if Carbon Trader B sold the credits to Investment Bank C *after* the credits were issued (and in Trader B's account), Trader B would merely transfer the credits to Bank C's account. In these circumstances, neither Seller A nor Trader B would have filed a revised power of attorney form in favor of Bank C. The sale to Bank C will not be recorded by this study. In short, this examination excludes secondary market sales that are not verifiable through Registry records.¹⁴²

This secondary market exclusion is noteworthy, for the following reason: for 243 projects, there was no power of attorney on record or the form only mentioned the original Chinese entity's name.¹⁴³ These are classified separately as "No Power of Attorney" on record.¹⁴⁴ Similarly, the projects that only named the Chinese firm in the form were retained in the "China" column.¹⁴⁵ Plausibly, these projects (where no powers of attorney were filed, or named only the Chinese project developer) may have been subsequently sold to foreign buyers.¹⁴⁶ This is especially likely, since Chinese corporations prefer to sell the credits early rather than hoard them hoping that prices will rise in future.¹⁴⁷ Erring on the side of caution, this review retains these projects in the China column. Thus, traders in Europe and elsewhere may own more of the China credits than this study suggests.¹⁴⁸ In short, the evidence does not support the China argument that if the United States ratifies the Kyoto Protocol, enormous U.S. wealth will flow into Beijing. To the contrary, the numbers suggest the China argument may be a myth.

142. The vast majority of projects in this study utilize older versions of the Modalities of Communication form, which do not record secondary sales. However, in future, it may be possible to track secondary market sales because the more recent form provides a column for this data. *See* CDM REGISTRY, UNFCCC, *supra* note 98, at 2 ("Use this Section for Post-Registration Submissions Only").

143. No powers of attorney forms are available for 101 projects, and the forms for 142 projects only name the original Chinese project owner. *See infra* Figure 7. Details on these 243 projects are available in the Excel file compiled (on file with author and available on request).

144. Complete data compiled in Excel format (on file with author and available on request).

145. *Id.*

146. The form also allows the Chinese project developer to nominate an employee or subsidiary. In the case of such entries, they are retained in the "China" column. *See infra* Figure 7.

147. Interview with Carbon Trader, *supra* note 101.

148. *See infra* Figure 7.

2. *The Results.* The raw data tells the story. The power of attorney forms are frequently filed with the Registry, as early as at the start of the accreditation cycle, and reveal striking results. Close to 90 percent of the 2,168 Chinese projects in that period include a power of attorney in favor of international buyers.¹⁴⁹

One-hundred and one projects (or 4.66 percent of Chinese projects) do not include a power of attorney.¹⁵⁰ The forms for 142 projects (or 6.55 percent approximately) name only Chinese developers or original owners.¹⁵¹ The vast majority, 1,925 projects, include forms conferring non-Chinese corporations (or buyers) with the right to instruct the Board to transfer the credits generated.¹⁵²

Analyzing who held the powers of attorney for these credits yields illuminating results. Over 158 corporate groups are involved and together hold the powers of attorney for 1,925 projects.¹⁵³ Of these, a vast majority of buyers own only a few projects; for example, several buyers own only 10–20 projects.¹⁵⁴ In fact, only 9 buyers own fifty or more projects, and these buyers are included in Figure 7.¹⁵⁵ These 9 buyers account for 822.5 projects.¹⁵⁶ The rest own less than 50 projects each, and are combined under “Other Buyers.” The Other Buyers account for 1102 projects, or 50 percent of China’s portfolio.

The specific corporate groups that own a significant stake are as follows. The Sweden based Carbon Asset Management, is the single largest buyer and owns approximately 148 projects or 6.85 percent.¹⁵⁷ The Geneva

149. Complete data compiled in Excel format (on file with author and available on request).

150. *See infra* Figure 7.

151. *Id.*

152. *Id.*

153. *See infra* Table 1, Appendix 2 for the list of over 158 buyers. Of these 158 buyers, over 40 corporate groups buy projects through multiple subsidiaries or related entities. For the list of the related entities that are combined to generate Table 1 and Figure 7, see Table 2, Appendix 2. *See also* explanation *infra* note 155.

154. *See infra* app. 2, tbl.1.

155. Generally, the buyers are listed as they are named in the original forms, with one exception (described below). Several buyers (Camco, for instance) prefer to own credits utilizing more than one of its entities or subsidiaries. In other words, one firm through multiple subsidiaries may own credits from one project. Similarly, a buyer operating through its parent company and related entities purchases credits from different projects. Hence, this study combines select entities to more accurately represent who owns the credits. For better analysis, only entities that are *prima facie* or obviously closely related entities are aggregated. No additional sleuthing to discover precise shareholder patterns etc. is undertaken. For the list of the entities that are combined, see Table 2, Appendix 2. As a result, several buyers (Camco, for instance) end up with over 50 projects. This review adds up the powers of attorney held by several Camco companies in order to arrive at the Group’s figures.

156. *See infra* Figure 7.

157. The final results yield figures in decimal point (or fractions) because of the methodology followed to allocate projects involving multiple buyers. *See supra* Part III.B.1 (Methodology).

based Carbon Resource Management, having purchased around 126 projects or 5.812 percent, cinches the second place.¹⁵⁸ U.K. based corporations EcoSecurities and RWE come in third and fourth respectively, with 118 projects or 5.44 percent and 99 projects or 4.56 percent.¹⁵⁹ Switzerland's Vitol S.A., United States' EDF Trading, and Japan's Mitsubishi are the other large buyers who possess the powers of attorney for more than fifty projects.¹⁶⁰

As discussed earlier, even the 11 percent (or 253 of the total 2,168 projects) where owners did not file any power of attorney form (or where the form names only the Chinese owner) may have been subsequently sold.¹⁶¹ Whether or not these credits are still with China cannot be verified through publicly available data.¹⁶² The study merely indicates the owners either did not file a power of attorney, or listed only a Chinese corporation. Assuming *arguendo*, China still owns these credits, this does little to dilute the findings—China liquidated vast majority of its credits, and mostly non-Chinese firms based in industrialized nations bought these credits. So, this Article will err on the side of the caution and leave the 153 projects for which no forms were filed, under the China account.

158. See *infra* app. 2, tbl.1. Carbon Asset Management has since become a wholly owned subsidiary of Vitol S.A., increasing Vitol's carbon portfolio. To keep it simple, and since it is unnecessary for the central thesis of disputing the China argument, this Article will not unnecessarily meander into identifying which parent corporation may own what percentage of credits indirectly. This study uses the entity named in the documents submitted to the Registry.

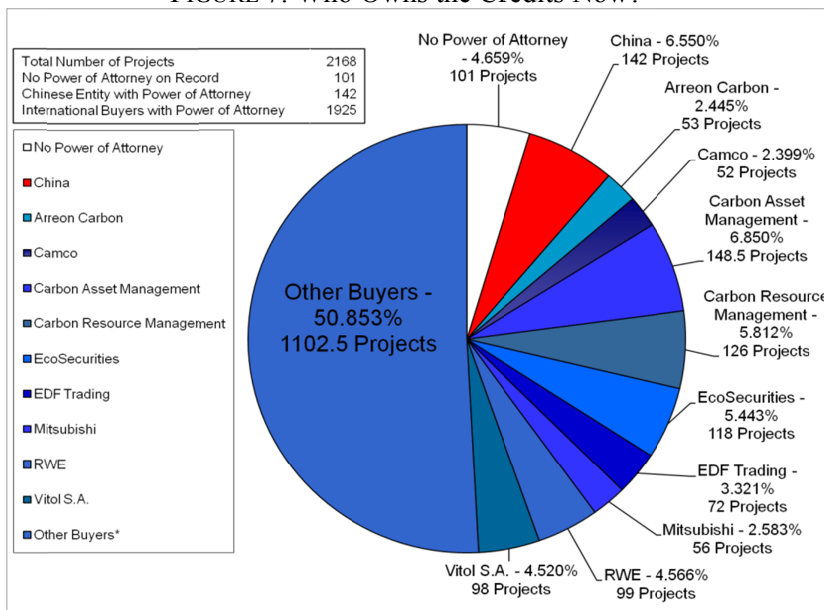
159. *Id.*

160. See *infra* Figure 7.

161. The International Carbon Trader, *supra* note 101, stated, Chinese entities prefer to sell credits rather than wait for possible higher prices in future. Hence, he surmised, it is highly likely that even the credits ostensibly in the China column – for which no forms were available, were sold to foreign buyers after the project was registered, or credits issued. For further discussion, see *supra* Part III.B.1.

162. The Registry only requires the owner to file these forms, and keep these records when credits are sold at early stages of the project, before the certificates are issued. If any owner sells them after the Board has credited the certificates (into the owner's account), the owners do not have to file any forms with the Registry. Hence, later sales cannot be tracked or calculated with certainty. See *supra* Part III.B.1.

FIGURE 7: Who Owns the Credits Now?



An objection to this study could be that the survey focuses solely on buyers possessing the power of attorney, and so, in projects involving multiple buyers, it may have skewed the analysis in favor of one buyer. In other words, the study does not adequately recognize smaller buyers (who do not hold a power of attorney). For example, what if the form names an international entity, but the other buyers involved in the project are Chinese entities? We can eliminate this scenario easily. China, as a Non-Annex I country, is not subject to enforceable emission reduction targets, and so its corporations do not need to purchase any credits to make-up potential shortfall.

Another version of the objection could be as follows. For example, in a project involving multiple buyers, the power of attorney is drawn in favor of the biggest stakeholder. In this study, the power of attorney holder would be reflected as owning 100 percent of the credits, whereas this buyer's share could be less than 100 percent and another buyer could own a minor stake. As a result, it could be argued, this study could be exaggerating the stake held by the large owners. On the one hand, this does not alter the primary conclusion—China has sold most of its credits, and so, the China argument is shown to be a myth. On the other hand, there is a small possibility that the Chinese owner provides the power of attorney to one international buyer, but in reality, Chinese corporations are the other buyer(s) involved in the project. Hence, the following Part 3 shall provide a

second empirical study that tests for and eliminates the possibility that Chinese buyers are involved, albeit purchasing smaller stakes.

3. *A Second Test.* In addition to powers of attorney, the Registry provides a second method to verify whether the conclusion that China has sold its portfolio to international buyers is indeed accurate. The Registry also maintains records on “project participants,” or countries that are participating in a particular project.¹⁶³ For example, the Chinese project owner names several entities as “project participants,” who have the right to be copied on all communication from the Board.¹⁶⁴ It is standard business practice for various buyers to be listed as participants, and the owner can nominate one or more of the participant firms as the holder of the power of attorney to transfer credits, as explained earlier.¹⁶⁵ There is a possibility, however small, that the Chinese owner provides a power of attorney to an international buyer but all other buyers are Chinese entities.

163. The information is listed under the “Other Parties” column, *Project Activities Submitted for Registration*, PROJECT CYCLE SEARCH, UNFCCC, http://cdm.unfccc.int/Projects/request_reg.html (last visited Dec. 28, 2013).

164. *Project Participants*, BAKER & MCKENZIE, <http://cdmrulebook.org/69> (last visited Dec. 28, 2013) (“Project participant is defined in the *CDM Glossary of Terms* as follows: [A] project participant is (a) a Party involved, which has indicated to be a project participant, or (b) a private and/or public entity authorized by a Party involved to participate in a CDM project activity (*CDM Glossary of Terms*, Version 03). An entity can become a project participant before or after registration of a CDM project, but must always have a letter of approval from a Kyoto Protocol Party before it can do so and subsequently receive CERs from that project. Receipt of CERs by way of a secondary transfer represents an exception to this.”). See also *id.* (Rights of Project Participants). As a carbon expert explains: “Project Participants are the private or public entities that each Annex I party [advanced nation] and the host country authorize to participate in and undertake the project. Annex I parties decide which private or public entity are allowed to participate in the Kyoto Protocol market (the rules are left up to each Annex I party); whereas the host country decides on whether the seller may participate in the market, and whether the project meets the sustainable development requirements of that host country. These approvals are entirely separate from the internal arrangements the firms may put in place with respect to communicating with the Board regarding with credits. Under the Kyoto Protocol rules, project participants must agree on who will act as focal point(s) for the project and what delegated authority the focal point (s) would have in respect of the distribution of CERs (into relevant accounts of participants once credits are issued). Under the market rules, only participants can receive credits directly from the Registry into their account; this is why Buyers insist on not only being the focal point but also participant so that they can receive the credits directly into their accounts.” Interview with Paul Curnow, *supra* note 101.

165. For instance, in the case of Project 0011: Project for GHG Emission Reduction by Thermal Oxidation of HFC23 in Jiangsu Meilan Chemical CO. Ltd., Jiangsu Province, China, a slew of corporations from Japan, Spain, Italy, Denmark, Netherlands, Canada (subsequently withdrawn), U.K., Finland, Norway, Germany, Switzerland, France, and Sweden were involved and most were listed on the form as to be copied on communications. But the project owner provided the sole right to transfer credits to the International Bank for Reconstruction and Development. See *Project 0011: Project for GHG Emission Reduction by Thermal Oxidation of HFC23 in Jiangsu Meilan Chemical CO. Ltd., Jiangsu Province, China*, UNFCCC, available at <https://cdm.unfccc.int/Projects/DB/JQA1144312006.34/view> (last visited Dec. 28, 2013).

If this is commonly occurring, then China continues to own significant number of credits, which could negate the results of Part B.2., showing that China alienated its credits. Thus, this Part B.3. will examine the project participants' data to verify whether the conclusion in Part B.2. is accurate. The Registry data on project participants provides one additional advantage—it names and lists the countries that are involved which allows us to discern whether China owns more credits than estimated in Part B.2.

The following methodology is employed to examine the country participant data. As with the power of attorney analysis, this survey includes all the Chinese projects, eliminating any objection of selection bias. Next, for each of the 2,227 projects, all the participants are included in the study.¹⁶⁶ The project participants' data has one advantage over the powers of attorney data – it lists the country corresponding to each corporation. Hence, it helps us accurately measure which countries own and are participating in China's carbon credit projects.

Though the power of attorney is generally drawn in favor of one party, the number of project participants is typically higher - typically three (or more) parties, which frequently include participants from different countries. In many transactions, two or more buyers create a joint venture or other business arrangement and act together to buy the credits earned from a single project.¹⁶⁷

When projects involved more than one buyer, the participation was weighted so that each participating buyer was assigned an equal share in the project they are involved in. If the form listed only one buyer, that buyer received full credit (or was assigned "one"). For projects with multiple buyers, the share (or the number one) was divided between the buyers.¹⁶⁸ For example, if Switzerland, the Netherlands, and the United Kingdom bought credits from the same project, each participant is assigned a share of .334. The shares of the buyers from one country are then added up to create a country's total weighted participation average.

One possible objection to this study could be that it provides equal weight to all countries, whereas a nation could have bought more or less shares than others. For instance, three buyers from the United Kingdom, Netherlands, and Switzerland respectively buy credits from one project. Let us assume *arguendo* that the U.K. entity acquires a majority of the credits,

166. For instance, the United Kingdom of Great Britain and Northern Ireland and Switzerland are listed as project participants for Nanjing Tianjingwa Landfill Gas to Electricity Project. See *Project 0071: Nanjing Tianjingwa Landfill Gas to Electricity Project*, PROJECT CYCLE SEARCH, UNFCCC, <http://cdm.unfccc.int/Projects/DB/DNV-CUK1129289693.13/view> (last visited Dec. 28, 2013). Figures 8 and 9, *infra*, are created by extracting the data for all the Chinese projects. The complete data as collated and compiled in Excel format is on file with the author (and available on request).

167. For an illustration, see *infra* note 172.

168. *Id.*

and the Swiss and Dutch corporations buy smaller shares. In this case, the United Kingdom's quantitative participation would be higher than the .334 that is assigned as per the survey's methodology.¹⁶⁹

This objection can be easily set aside for the following reasons. First, the initial study tracking powers of attorney already examines and measures senior buyers.¹⁷⁰ In contrast, the second study measuring participants is intended solely to corroborate the earlier finding that China sold its portfolio to international firms. Second, this Article demonstrates that China has alienated its gargantuan credit stockpile and so a possible U.S. entry into the emissions market will not provide as much gain to China as the conventional wisdom suggests. The number of shares the United Kingdom buys relative to Switzerland is beyond the scope of this Article. Third, sharing arrangements between private buyers cannot be conclusively tracked through public records. Since any estimates of such private arrangements would be speculative, it is not included here. This Article seeks to test the veracity of the China argument, and so, restraining from speculating on each buyer's precise share does not affect the conclusions of this study.

Lastly, the following feature is worth noticing before the reader turns to the empirical results. There is little possibility that an entity named in this form may be a hired service provider: Owners would not be willing to authorize contractors with the power to communicate with regulators, such as the Board. And so, the owners are unlikely to include, as a participant, a contractor who merely provides carbon development services (for example, in developing the registration documents).¹⁷¹ Thus, the possibility that an entity named in this form may be a hired service provider is easily disproved.

The results of this study corroborate the power of attorney study and further strengthen the conclusions. As shown in Figure 8 below, the United Kingdom is the single largest buyer, picking up 742.43 projects or 36 percent of Chinese projects.¹⁷² Switzerland cinches the second place, and

169. In this example, according to carbon market rules, the Swiss and U.K. buyers' permission would be required to transfer any of the credits. In practice, it is unlikely that lawyers or owners of a larger chunk of the shares would agree to confer a minor buyer with the power to block or refuse to transfer credits. So this possibility can be eliminated.

170. See *supra* Part III.B.1–2.

171. See MIRIAM HINOSTROZA, UNEP RISØE CENTER, CDM PDD GUIDEBOOK: NAVIGATING THE PITFALLS 28 (3d ed. 2011), available at http://cd4cdm.org/Publications/PDDguidebook_3rdEdition.pdf ("Pitfall 2: Project participants not clearly identified . . . Typically, consultants, DNAs and local municipalities do not have a share in the distribution of CERs."). The owner will be conferring significant powers to parties named in the form, and absent transfer in ownership, corporations do not nominate unrelated third parties lightly.

172. The final results for number of projects sometimes involve decimal points (or fractions) because multiple buyers frequently purchase credits from one project, and so, the project share is

purchases 14 percent or 302.79 projects. Japanese buyers are third in line, and account for 12 percent or 276.78 projects. Netherlands and Sweden also own substantial portions of Chinese projects, accounting for 12 percent and 9 percent, respectively. The following European nations are the other significant purchasers – Germany (4 percent), Austria and France (2 percent each), and Spain, Italy, Norway and Finland (1 percent each). “Others” in Figure 8 includes some countries that own credits from a few projects. If we utilize this project participant study (rather than the right to transfer the credits we measured in Part B.2.) to determine what percentage of credits China owns, then by this measure China has sold over 96 percent of its projects.

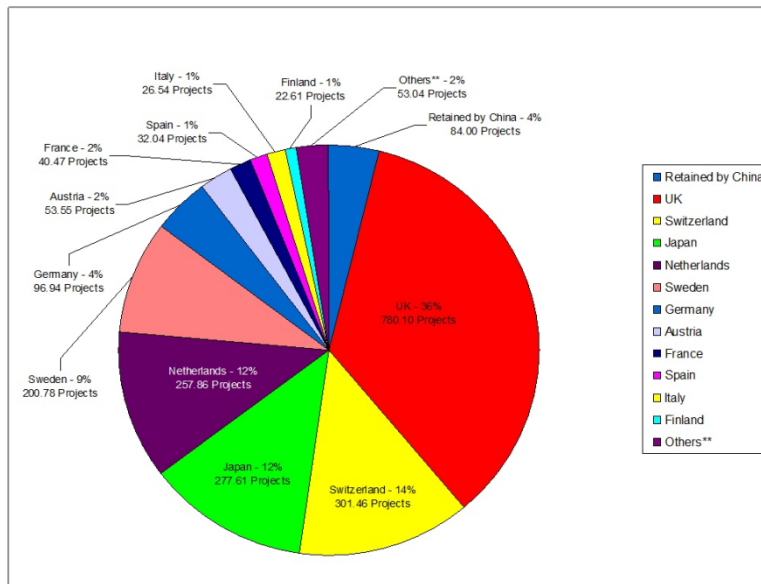
Less than 4 percent (84 projects) do not list other countries as participants in the projects carried out in China.¹⁷³ As discussed earlier, this does not prove that these credits are still with China, or that they were not sold subsequently.¹⁷⁴ Similar to the first study measuring powers of attorney, when no public records are available, the second study on project participants’ data also retains these projects in the ‘China’ column. The second study shows that China liquidated its holdings and that traders in industrialized nations now own the credits, corroborating the first empirical study which relies on power of attorney holders data.

divided between these buyers (to accurately represent the facts, and to avoid double counting). For a discussion of the methodology, see *supra* Part III.A.

173. See *infra* Figure 8.

174. For an explanation of the methodology utilized when no powers of attorney exist, see *supra* Part III.A.1.

FIGURE 8: International Participants Listed for Chinese Projects
2,227 Projects Registered until July 9, 2012¹⁷⁵



** Others include Norway (21.61), Denmark (12.80), Canada (1.61), Portugal (6.33), Belgium (4.22), Luxembourg (1.22), Australia (3.5), Liechtenstein (1), and Ireland (.75).

One possible objection to this study could be that it counts the number of *projects*, rather than the number of *credits*. In other words, what if China sold its small projects but retains the projects that generate more credits? China does not list any other participant for 84 projects (or 4 percent of the total projects). Does this mean China continues to own a significant number of credits (albeit through a smaller number of projects)? To account for this possibility, an additional study was made measuring the number of credits (rather than number of projects) that the international buyers have bought.¹⁷⁶

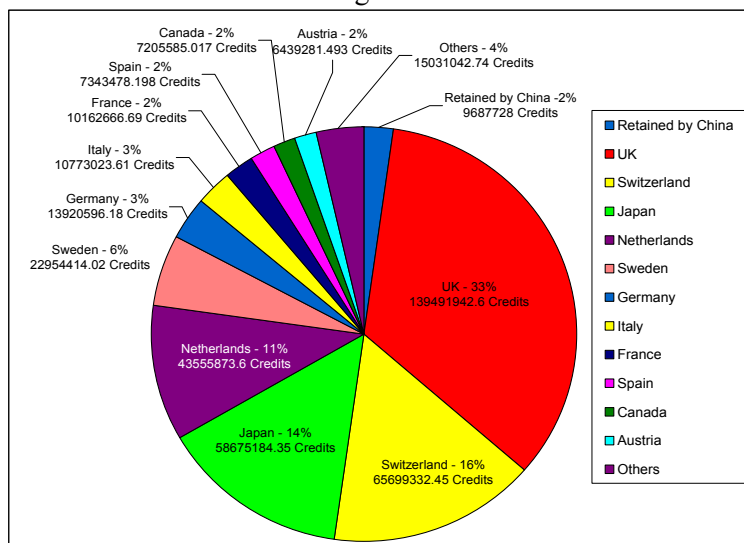
As Figure 9, reveals, calculating the number of credits rather than projects reduces China's share even further, and only marginally changes

175. Figure 8 is generated utilizing all the Chinese projects registered as of July 9, 2012, which amount to 2,227 projects. By contrast, Figure 4 is generated utilizing data the UNFCCC released on July 9, 2012, which lists 2,161 as the total number of projects from China. The UNFCCC chart may have been *released* on July 9, 2012 but *prepared* earlier. This explains the difference in the total number of Chinese projects. In any event, including a few additional projects does not adversely impact the results. Further, the number of projects is in decimals because when multiple buyers are included, projects are divided between them as explained in *supra* note 172.

176. See *infra* Figure 9.

the shares of individual nations (or buyers).¹⁷⁷ Simply put, the numbers do not support the possibility that China engages in strategic behavior, selling its small projects while retaining the largest ones to obtain vast sums from the United States, if the United States chooses to enter the market.

FIGURE 9: Measuring the Number of Credits



4. *Response to Possible Objections.* There may be two other objections to this data. A first objection may be that the studies in this Article only track “first” or initial sales and not any subsequent ones. Hence, one can argue, the U.K. traders could have subsequently sold a large number of the credits they bought and thus if the United States enters the market and buys credits, the revenues may flow to another country and not to London. Conceivably, this scenario may be true, but this objection does not affect the central argument of this Article. With regard to this “subsequent sales” objection, the fact still remains that *China has sold its credits*, putting to rest U.S. fears that enormous cash will flow from America to China if the United States signs the Kyoto Protocol.

With regard to the powers of attorney study, one objection could be as follows. A buyer may buy only a portion of the total credits emanating from a project – either a fixed number or percentage, and the Chinese producer may have retained a sizeable amount. This possibility can be

177. The methodology used to tabulate the data and generate Figure 9 is as follows. The Registry provides an estimate of credits expected from each project. Each country is assigned an equal share of the credits from each project, and then each country’s number of credits from all its projects are added up to generate a nation’s total number of credit purchases.

easily set-aside. First, it is highly unlikely that a firm would be willing to grant another firm the *complete* right to transfer all credits, if the buyer is only acquiring a small percentage of the credits.¹⁷⁸ Second, this scenario is even more improbable given the economics of developing a carbon project.¹⁷⁹ Developing a carbon project involves significant transaction costs, including (a) the costs of preparing and filing the registration documents, and (b) agencies' fees for various services.¹⁸⁰ These costs are frequently borne by buyers (if they purchase credits prior to registration), and so, buyers are unwilling to incur these costs if they gain only a small percentage of credits from a project, as confirmed by the Carbon Trader.¹⁸¹

Moreover, well-placed carbon traders confirm that Chinese producers choose to enter into, and sell their credits early, (rather than storing the credits expecting prices to rise in future).¹⁸² Moreover, a leading carbon

178. As per the carbon market rules, owners have the option of choosing to provide buyers with a full ("sole") right to transfer the credit or share it with other entities. See the discussion on "sole," "shared," and "joint" power of attorney in *supra* notes 141–143 and accompanying text.

179. Carbon service firms (preparing forms) increasingly prefer to be paid in credits. They prefer to buy all or most of the credits at a lower rate rather than earn a small consultancy fee. Hence, the possibility that firms named as participants or holding powers of attorney provide only services (with no ownership stake in the credits) can be refuted. Interview with Carbon Trader, *supra* note 101.

180. Developing a carbon project involves the following costs: (a) Agencies' charges - For instance, agencies' fees increase if the parties opt for more frequent verification; (b) Board's registration and issuance fees - This approximately ranges around 0.10 – 0.20 USD per tonne of CO₂ for registration, and similar fees are charged every time credits were issued; (c) Adaptation fee - 2 percent of credits are retained by the Board to assist nations that are threatened by climate change consequences; (d) Costs of preparing PDD and other document required for registration. Kyoto Protocol, *supra* note 4, at art. 12 para. 8; *Background Paper of the UNFCCC Workshop on the Adaptation Fund on Share of Proceeds to Assist in Meeting the Costs of Adaptation*, at 1–3 (May 3–5, 2006), available at http://unfccc.int/files/cooperation_and_support/financial_mechanism/financial_mechanism_gcf/application/pdf/adaptation_sop.pdf. See also McNish, *supra* note 17, at 413 (providing a detailed description of the various transaction costs involved in obtaining credits).

181. Interview with Carbon Trader, *supra* note 101.

182. *Id.* As a carbon expert explained: "Certainly the market in China for CDM projects is very different from the approach taken by Indian sellers. In India, sellers tend to favor a unilateral approach, i.e. developing the CDM project themselves - often without the certainty of a forward contract with an Annex I Buyer - and then only looking to enter into spot sales once the projects were registered and starting to generate credits. China displays the opposite practice. Indeed, the Chinese government policy does not allow unilateral carbon projects (even though the international rules did allow it): the National Development and Reform Commission (NDRC) - which is the Designated National Authority for China - required Chinese sellers to show they have a willing Annex I Buyer and a contract in place for the sale of the credits (and it would only be a few years later that China introduced the additional floor price requirement into the approval process). Given China's position on unilateral CDM, Chinese sellers have to enter into forward sales with Annex I Buyers in order to take advantage of the CDM. It is market practice in China - and indeed required by the NDRC - to sell 100% of the credits to the Annex I Buyer - except where a percentage might go to a project consultant or advisor (who in turn typically sells forward rather than seeking to hold on to them). Sellers do not retain any percentage for later sale into the market (unlike the market practice of many Indian sellers)." Interview with Paul Curnow, *supra* note 101.

trader also explains that generally, only buyers and not consultants were granted the power of attorney(s) forms deposited before the Board.¹⁸³ Indeed, as the carbon trader explained the possibility that if any industry owner is determined to retain the credits, perhaps with the intent to sell them directly after the credits are issued, owners have the option to engage carbon firms as consultants and pay them a fee (rather than agree to sell the credits forward).¹⁸⁴ If a Chinese producer hires a carbon consultant and opts to develop the credits for their own account, it is unnecessary to issue a power of attorney in favor of the consultant for the purpose of merely developing the project, which makes it unlikely that this practice is widespread.¹⁸⁵

A third potential objection may be that the data is “static.” What if China registers new projects and earns additional credits rapidly as soon as the United States ratifies the Protocol? In that event, China could still be a huge beneficiary of U.S. wealth, plausibly negating this survey. This potential critique can be easily rebutted. As per carbon rules, China cannot register *past* activities and so, cannot easily flood the market.¹⁸⁶ Furthermore, there is a significant interval of time between registration (or starting the process to earn credits) and when credits are actually earned (or issued). Either way, the market cannot be flooded overnight. Importantly, it is not in China’s interest to increase supply drastically when the *demand for credits is fixed* (as per the Kyoto Protocol’s targets), because that will reduce the price.¹⁸⁷ Moreover, the arithmetic does not support this possibility, because the vast majority of China’s credits are not “retired” or already used to set-off past targets.¹⁸⁸ Instead, they have been bought by traders with the intention of subsequently selling them.¹⁸⁹ Hence, the United States has the option to purchase credits from a large number of trading firms in advanced nations, as well as the other developing nations, which totals up to 95 percent of the credits issued until now.¹⁹⁰

In short, these potential objections may be easily overcome. The empirical results clearly show: China sold a hefty portion of its credits and so, any future earnings will be retained by these trading firms. Thus, the

183. Interview with Carbon Trader, *supra* note 101.

184. *Id.*

185. *See supra* notes 137–139.

186. Kyoto Protocol, *supra* note 4, at art. 12 para. 5(c).

187. For a discussion on the fixed targets provided for advanced countries by the Kyoto Protocol, see *supra* Part II.

188. I am grateful to Liz Sheargold for pointing this out.

189. *See supra* Figure 7.

190. *See supra* Figure 4 (showing that India, Brazil and other developing nations owned nearly 50 percent of the credits issued until now); *supra* Figure 7 (showing most of China’s projects have been bought by carbon traders).

findings in this study prove, it is highly implausible that enormous U.S. wealth will be transferred to China through emissions trading. This Article, thus, removes the biggest stumbling block that stymies U.S. legal scholarship and policy on climate change.¹⁹¹ In addition to the China argument, the existing scholarship raises a few other analytical arguments against U.S. participation in the Kyoto Protocol, which shall be discussed in the following Part.

IV. THEORETICAL IMPLICATIONS

American climate change literature to date focuses on China, and the “China myth” sharply influences the United States’ response to the global emissions debate. Indeed, Posner and Sunstein argue, so long as China’s emissions are not capped, the United States could not be held responsible for climate change under either a corrective or distributive justice theory.¹⁹² Dan Farber responds to Posner and Sunstein’s argument with a moral theory—the United States is “morally” responsible for its emissions, independent of Chinese liability.¹⁹³ Both sets of scholars base their theory and conclusions on the premise (or fear) that U.S. wealth will flow to China if an international emissions treaty is ratified. Indeed, this Article is the first to check whether market facts support this presumption about China; in fact, the evidence unearthed by this study shows the presumption is false, and thus arrests the “China myth.”

In addition to the “China myth,” justice theorists point to a few theoretical reasons to argue the United States is not obligated to ratify the Kyoto Protocol. In support, they argue that the present regime does not fulfill the conditions of either corrective or distributive justice theory.¹⁹⁴ This Part will show the gaps in the theoretical objections that justice theorists put forward.

Scholars such as Posner and Sunstein declare the climate claim falls short of justice standards because it does not fit into one of the following boxes: pure corrective justice or distributive justice.¹⁹⁵ In the process, caricatured versions of the climate claim are presented. For instance, Posner and Sunstein present the corrective justice claim as punishing the “United States for its wealth,” because the nations most at risk were

191. See sources cited *supra* note 3 for the legal scholars who have been seeking to formulate a cogent theory for U.S. participation in the Kyoto Protocol but were stymied by the China argument. See also sources cited *supra* notes 41, 44 (showing how the Senate has resisted ratifying and passing emission regulations because of the China argument).

192. Posner & Sunstein, *supra* note 3, at 1611–12.

193. Farber, *supra* note 5, at 379; Farber, *supra* note 3, at 17.

194. See, e.g., Posner & Sunstein, *supra* note 3, at 1611–12.

195. *Id.*

poor.¹⁹⁶ Similarly, they state, the grounds for distributive justice grounds are not fulfilled because emission funds are a “crude means of producing . . . redistribution”¹⁹⁷ But the climate claim is different from this wealth redistribution theorem. The greenhouse gases that the United States emits form the crux of the claim, not its wealth.¹⁹⁸

Furthermore, the climate claim rests not only on *past emissions* but also the tonnes of greenhouse gases that the United States *continues to emit at present and in the foreseeable future*.¹⁹⁹ Posner and Sunstein, however, ignore present and continuing emissions entirely.²⁰⁰ Instead, they declare, the United States is being held liable solely because of its past emissions or “wrongful behavior that occurred in the past,” (or the corrective justice rationale).²⁰¹ This argument misrepresents the climate claim as wholly “backward-looking” punishment for past behavior, even though the claim includes both past and present emissions.²⁰² Interestingly, Posner and Sunstein conclude, the climate justice argument fails to meet the conditions necessary to successfully obtain compensation in a tort suit in the United States, and so, the corrective justice claim is dissolved.²⁰³ Corrective justice may be the philosophy informing tort law²⁰⁴ but that does not mean the

196. *Id.* at 1565.

197. *Id.*

198. In short, the United States is not being targeted or punished for its wealth as the Posner and Sunstein theorem declares, but because its industrial activities led to the effluents. Other industrialized nations such as Europe have assumed responsibility based upon this principle. The United States remains the only major industrialized nation refusing to accept the international accord, an aspect often under-emphasized in standard accounts. *See* Farber, *supra* note 5, at 398 (“The United States government has stood virtually alone among industrialized countries in opposing serious action on climate change.”).

199. For context and a cogent discussion on the arithmetic of U.S. emissions in the past and continuing emissions (including in the future) and resulting harm see Farber, *supra* note 5, at 385–87 (“The [temporal pattern from 1800 to 2004], obviously, is a sharp upward movement in the amount of [U.S.] emissions. . . . [T]he United States is on track to emit as much this decade [2000 to 2010] as it did for the entire period from 1900 to 1940. Even if we were to stabilize the level of CO₂ in the atmosphere, climate change would continue for several decades and to a lesser extent thereafter. On the other hand, if we were able to reduce greenhouse gas emissions sharply, global temperature increases would moderate within a decade.”).

200. *See, e.g.*, Posner & Sunstein, *supra* note 3, at 1567 (“While the emissions of the United States are growing relatively slowly, that nation remains by far the largest contributor to the existing ‘stock’ of greenhouse gases. Because of its past contributions, does the United States owe remedial action or material compensation to those nations, or those citizens, most likely to be harmed by climate change?”). Clearly, Posner and Sunstein ignore and underplay the arithmetic of U.S. emissions. Even if China’s annual emissions today exceeds the United States’ that does not mean the United States’ emissions are erased or become zero.

201. *Id.* at 1592.

202. *See* discussion *supra* notes 199–200.

203. *See* Posner & Sunstein, *supra* note 3, at 1592.

204. Notably, Aristotle’s original discussion on justice focuses on the notion of justice and not specific laws such as tort. *See* ARISTOTLE, THE NICOMACHEAN ETHICS bk. V (Betty Radice et al. eds.,

philosophy of corrective justice stands reduced to tort law.²⁰⁵ Accepting Posner and Sunstein’s proposition will lead to the following absurd result – if tort law requirements are not fulfilled, all corrective justice claims will be erased.

This Article agrees with Posner and Sunstein’s analysis that a justice theory, perhaps based upon “welfarist considerations,” as they call it, may be better suited to address the climate change issue.²⁰⁶ However, this study differs from Posner and Sunstein’s conclusion that the United States is not responsible for its emissions because of the “China myth.” Posner and Sunstein’s objection can be stated thusly: On the one hand, China is not made responsible for its emissions. On the other hand, the present regime requires the United States to compensate the victims, which in this case includes China, even though China is one of the largest emitters today.²⁰⁷

Significantly, the empirical analysis in this Article disproves the factual assumption central to Posner and Sunstein’s thesis. The Protocol does not insist that the United States must transfer funds to China through the emissions market. The Kyoto Protocol rules only require industrialized nations, such as the United States (if it ratifies the Protocol), to limit their emissions. The United States is perfectly free to offset its emission reduction targets through domestic efforts. If any U.S. firm fails to meet its target, it is free to purchase credits from other U.S. firms, or from sellers in any other nation.²⁰⁸ There is no insistence that the United States purchase only from China. Moreover, as the empirical study ably demonstrates, non-Chinese traders now own most of the credits initially earned by China. Hence, unlike Posner and Sunstein’s claim, the existing framework scarcely compels ‘innocent U.S. citizens of today’ to make reparation to non-victims in China.

J.A.K. Thomson trans., Penguin Classics 2004). Aristotle’s original discussion focuses on justice, and two forms of particular justice – one involving distributions of honor or money or things that may be divided, and a second part that plays a rectifying part in transactions between men. Philosophy does not insist that the concept of justice is manifest as tort law; rather, tort law theorists have reached backward to justify tort remedies on the basis of a justice philosophy. *See, e.g.*, Ernest J. Weinrib, *Corrective Justice in a Nutshell*, 52 U. TORONTO. L.J. 349, 349 (2002) (explaining that “corrective justice has become central to contemporary theories of private law,” such as tort, and this is the result of legal scholars theorizing and drawing connections with and seeking ontological reasons); ERNEST J. WEINRIB, *CORRECTIVE JUSTICE* 15–16 (Timothy Endicott et al. eds., 2012).

205. Stated as equations, because the following equation 1 is true, that does not support the conclusion that equation 2 is correct.

Corrective Justice \rightarrow Tort (Equation 1)

Therefore, Corrective Justice \leftarrow Tort (Equation 2)

206. Posner & Sunstein, *supra* note 3, at 1612.

207. *Id.*

208. *See* Kyoto Protocol, *supra* note 4, Annex B. *See* also the discussion on four conditions that would need to be fulfilled for the United States to purchase credits from China, in *supra* Part II.

Before turning to the Conclusion, this Part will make a few observations that will be important for the development of climate justice theory in the future. A key theoretical objection that Posner and Sunstein put forward is that the existing framework fails to fulfill the “correlativity” condition of corrective justice theory.²⁰⁹ In other words, they contend that under the present regime, there is a mismatch between the parties being held responsible and the parties who are injured or who must be paid damages. Posner and Sunstein argue: First, the Protocol imposes liability on many innocent parties²¹⁰ Second, since only future generations are effected, current citizens of developing countries cannot claim to be victims of climate change (or at least the claim is pre-mature).²¹¹ Essentially, they insist corrective justice is negated because a finite list of wrongdoers and victims cannot be matched today.²¹²

The academic focus on wrongdoers, victims, and the need for a mirror relationship between the two (rather than the conduct or “creating effluents”) obfuscates the concept of “personality” that informs theories of justice. The normative concept of personality informing the theory of justice or even responsibility for outcomes is not new. Ernest Weinrib, for instance, discusses the Kantian concept of personality, and argues it is not necessary for a plaintiff’s loss to be precisely equal to defendant’s gain to fulfill the correlativity feature of corrective justice.²¹³

Similarly, Tony Honoré states, justice “presupposes that people are responsible for what they do and . . . for the outcome of what they do.”²¹⁴ In fact, Honoré posits that people are responsible for outcomes of their actions whether or not such results are intended or foreseeable (“outcome responsibility”).²¹⁵ Honoré’s theory is particularly apropos for and provides four benefits to climate justice theory. First, it provides a theoretical framework for when a state (or community) may be justified in holding a party responsible for its actions, even in the absence of fault. Honoré envisages a duty to pay compensation or a fine independent of the moral

209. WEINRIB, *supra* note 204, at 15–21.

210. Posner & Sunstein, *supra* note 3, at 1593. (“Many Americans today are, of course, immigrants or children of immigrants, and so not the descendants of greenhouse-gas-emitting Americans of the past.”).

211. *Id.* at 1594–96 (arguing future citizens of developing countries subject to climate effects may be the victims with valid corrective justice claim, but these claims would not have “matured” and could not be claimed by current non-victims.).

212. In short, “corrective justice requires an identity between the victim and the claimant: the person who is injured by the wrongdoer must be the same as the person who has a claim against the wrongdoer.” *Id.* at 1595.

213. WEINRIB, *supra* note 204, at 15.

214. TONY HONORÉ, RESPONSIBILITY AND FAULT 7 (1999).

215. *Id.* at 14.

blameworthiness of the conduct,²¹⁶ which answers Posner and Sunstein's concern that the emissions accord is also holding non-wrongdoers liable.²¹⁷

Second, outcome responsibility also answers another objection that Posner and Sunstein point out. They argue that the Protocol cannot be justified as an amalgam of corrective and distributive justice as these are mutually exclusive. According to Posner and Sunstein, an emissions accord could no longer be justified under corrective justice if it includes elements of distributive justice.²¹⁸ In effect, they rely on the Aristotelian historical distinction between corrective and distributive justice.²¹⁹ Honoré's outcome responsibility comes to the rescue of the Kyoto Protocol, and shows that corrective and distributive justice may not be as mutually exclusive as Posner and Sunstein claim. Honoré argues: Outcome responsibility "is "inseparable from our status as persons," or, "is central to "the identity and character of the agent."²²⁰ Agency or personality in turn, are inextricably linked to corrective and distributive justice:

Our responsibility for actions and outcomes requires us to bear the risk of bad luck both in the way we are constituted and in the external circumstances in which we find ourselves. [This] system of responsibility enables us to profit from good luck if what we do turns out better than we intended or foresaw. [T]he credit we receive from what turns out well balances the discredit we incur for what turns out badly. We cannot take the credit without the discredit, since that would be to violate the principle of taking the rough with the smooth – a principle that possesses moral force and can perhaps be regarded as a form of distributive (risk-distributive justice).²²¹

In short, "[o]utcome responsibility is a condition of corrective justice, but the justification of outcome responsibility depends in part on the justice of allocating responsibility according to risk, which is a matter of distributive justice."²²²

Third, outcome responsibility dissolves Posner and Sunstein's problem with holding collectivities responsible. Posner and Sunstein insist that the climate argument fails to fulfill the standards required for a valid corrective justice argument because it renders collectivities, such as nations, morally responsible for individuals' actions.²²³ According to Honoré, "[a]ccepting

216. *Id.*

217. Posner & Sunstein, *supra* note 3, at 1597–98.

218. *Id.*

219. See discussion and sources cited *supra* note 204.

220. HONORÉ, *supra* note 214, at 10.

221. *Id.* at 9.

222. *Id.* at 13.

223. Posner & Sunstein, *supra* note 3, at 1565, 1595.

responsibility for our actions makes for a better society,”²²⁴ and “in a collective interest,” the law could impose liability.²²⁵

Fourth, outcome responsibility would also be able to explain the “common yet differentiated responsibility” principle and other principles adopted by the Convention.²²⁶ For instance, while providing a theoretical basis for responsibility, Honoré provides flexibility for a narrower notion of legal liability.²²⁷ In the context of the climate treaty, Honoré’s theory enables us to recognize that all nations are responsible for emissions, and yet, create a law that imposes liability on a smaller subset of outcomes or countries. Thus, a theory built on this precept of outcome responsibility would: (a) accommodate the controversial “common yet differentiated responsibility” standard adopted by the Convention, which Posner and Sunstein label as “doublespeak,”²²⁸ and (b) answer the United States’ objection that the climate accord imposes different standards on the United States than it does on China.²²⁹ Clearly, outcome responsibility resolves the analytical objections Posner and Sunstein allude to.

The outcome responsibility philosophy in conjunction with broad moral and political philosophy, including John Rawls’ classic, *A Theory of Justice*²³⁰ raises interesting possibilities for the future development of a normative justification for climate justice.

CONCLUSION

This Article provides the first empirical study testing whether ratification of the Kyoto Protocol will result in the massive wealth transfers feared by the United States. To the contrary, the evidence suggested that the “China argument” may be a myth. Legal academics and legislators have proceeded on the presumption that the “China argument” is true. The “China argument” has been an especially thorny problem for academics. Legal scholars have been unable to craft a persuasive and cogent theory on why America should participate in the Protocol, if the existing regime will transfer huge sums of U.S. money to China. Indeed, justice theorists such as Posner and Sunstein have argued that under existing theories of justice

224. HONORÉ, *supra* note 214, at 10.

225. *Id.* at 9.

226. Posner & Sunstein, *supra* note 3, at 1607. *See also* Wiener, *supra* note 3, at 1824 n.67 (arguing that “extra allowances” would be needed for developing countries to make participation attractive in an international regime.)

227. HONORÉ, *supra* note 214, at 1.

228. Posner & Sunstein, *supra* note 3, at 1607.

229. *See supra* notes 30, 31, 34.

230. JOHN RAWLS, *THE THEORY OF JUSTICE* (1971). *See generally* AMARTYA SEN, *IDEA OF JUSTICE* (2009).

the United States has no obligation to ratify the Protocol as long as it does not place similar responsibilities and financial burdens on China as it would on the United States.²³¹ Dan Farber sought to answer justice theorists' argument with an argument from moral theory, saying that the United States is "morally responsible" for its emissions, and that its obligations are independent of China's responsibilities for its emissions.²³² Farber's response may be logically correct but fails to alleviate U.S. concern that the Protocol would become another avenue for American wealth to flow into China.

In fact, the U.S. Senate has refused to ratify the Protocol because it treats China differently than the United States. Senator Chuck Hagel (during Senate discussions on the Byrd-Hagel Resolution that he jointly proposed to reject the Protocol) chastised the administration for "advocating legally binding emission reductions for the United States and not for nearly 130 other countries, like China."²³³ Senator Byrd emphasized America's refusal to join the Protocol was directly connected to the Protocol's provisions that did not bind China in a manner similar to the United States. He stated that, so long as the treaty did not impose restrictions on China, "There will be no incentive for the Senate to approve such a treaty. I can guarantee you that there will be a mountain in the way which a mustard seed of faith will not, in itself, remove."²³⁴

Legal scholars and law-makers have presumed the "China argument" is true, without verifying whether this assumption has any basis in fact. This Article unearthed empirical evidence which shows that facts do not support the "China argument". The study revealed China alienated most of the carbon credits initially awarded to Chinese corporations. Indeed, there is little evidence or possibility that ratifying the emissions treaty will result in China gaining huge sums from America.

Thus, the survey exposed the "China argument" as a myth, and makes two important contributions. One, this Article eliminated the key issue preventing justice and moral theorists from crafting a climate justice theory, and thus, addresses a critical gap in scholarship. Two, it renders vital assistance to legislators too. Assuming the "China myth" is correct, the U.S. Senate continues to oppose U.S. participation in the Protocol and emission regulation.²³⁵ Thus, by arresting the "China myth," this Article dissolves the main objection pointed to by the U.S. Senate when opposing U.S. participation in the international emissions accord.

231. *See supra* note 6.

232. *See supra* note 8.

233. S. Rep. No. 105-54, at 10 (1997)

234. *Id.* at 18.

235. *See supra* notes 31, 34.

Indeed, this Article epitomizes Michael Heise's argument, "Where empirical questions lurk, data warrant at least as much respect as that accorded opinions and words. . . . Empirical work sheds important light on old legal issues and identifies and speaks to issues that the more traditional theoretical and doctrinal genres cannot reach."²³⁶ This study joins the long and distinguished line of scholarship that has publicized the importance of empirical research to law.²³⁷

236. Michael Heise, *The Importance of Being Empirical*, 26 PEPP. L. REV. 807, 833-34 (1999).

237. For the classic exposition on point, see Peter Shuck, *Why don't Law Professors Do More Empirical Research?*, 39 J. LEGAL EDUC. 323, 323-24 (1989). See also Richard Posner, *OVERCOMING LAW* 210 (1995); Derek Bok, *A Flawed System of Law Practice and Training*, 33 J. LEGAL EDUC. 570 (1983); Lawrence Friedman, *The Law and Society Movement*, 38 STAN. L. REV. 1 (1986); Richard Posner, *Against Constitutional Theory*, 73 N.Y.U.L. REV.1 (1998). Scholars from Justice Holmes to legal realists have emphasized the importance of empirical work. For early mentions as well as the history behind empirical legal research, see Michael Heise, *The Past, Present and Future of Empirical Legal Scholarship, Judicial Decision Making and the New Empiricism*, 4 ILL. L. REV. 819 (2002).

APPENDIX 1: COMPLETE LIST OF COUNTRIES WITH REGISTERED PROJECTS
(REPRESENTED IN FIGURES 6 AND 6A)

The following table includes all individual nations comprising the “Rest of” regional categories as well as the large contributors listed in Figure 6, totaling to 4,908 Projects.

Host Nation	Percentage of Projects	Number of Projects
China	49.49%	2429
India	19.64%	964
Brazil	4.95%	243
Mexico	3.16%	155
Vietnam	2.91%	143
Malaysia	2.44%	120
Indonesia	1.69%	83
Thailand	1.65%	81
Republic of Korea	1.55%	76
Chile	1.26%	62
Philippines	1.24%	61
Rest of South America	2.95 %	145
Bolivia	0.12%	6
Uruguay	0.18%	9
Paraguay	0.04%	2
Guyana	0.02%	1
Ecuador	0.39%	19
Argentina	0.63%	31
Colombia	0.86%	42
Peru	0.71%	35
Rest of Asia	2.77%	136
Bangladesh	0.06%	3
Cambodia	0.12%	6
Democratic People’s Republic of Korea	0.02%	1
Laos	0.08%	4
Bhutan	0.04%	2
Mongolia	0.08%	4

Nepal	0.12%	6
Pakistan	0.31%	15
Singapore	0.04%	2
Sri Lanka	0.22%	11
Armenia	0.10%	5
Azerbaijan	0.02%	1
Cyprus	0.16%	8
Iran	0.22%	11
Qatar	0.02%	1
Syria	0.06%	3
UAE	0.12%	6
Uzbekistan	0.29%	14
Georgia	0.06%	3
Israel	0.61%	30
Rest of Africa	2.04%	100
Cameroon	0.04%	2
Democratic Republic of the Congo	0.04%	2
Ethiopia	0.02%	1
Ghana	0.02%	1
Jordan	0.08%	4
Kenya	0.16%	8
Lesotho	0.02%	1
Liberia	0.02%	1
Rwanda	0.06%	3
Senegal	0.08%	4
Cote d'Ivoire	0.06%	3
Tunisia	0.04%	2
Uganda	0.24%	12
Morocco	0.16%	8
Mozambique	0.02%	1
Zambia	0.02%	1
Madagascar	0.04%	2
Mali	0.02%	1
Rest of Europe	0.29%	14
Albania	0.06%	3

Bosnia and Herzegovina	0.02%	1
Serbia	0.08%	4
The former Yugoslav Republic of Macedonia	0.04%	2
Republic of Moldova	0.08%	4
Rest of North and Central America	1.79%	88
Costa Rica	0.22%	11
Cuba	0.04%	2
El Salvador	0.16%	8
Guatemala	0.29%	14
Panama	0.20%	10
Jamaica	0.04%	2
Dominican Republic	0.10%	5
Nicaragua	0.18%	9
Honduras	0.55%	27
Rest of Oceania	0.16%	8
Fiji	0.04%	2
Papua New Guinea	0.12%	6

APPENDIX 2: COMPLETE LIST OF POWER OF ATTORNEY HOLDERS

TABLE 1: POWER OF ATTORNEY HOLDERS (LEADING TO FIGURE 7)

Methodology: Please note as per carbon market rules, the Executive Board accepts different types of powers of attorney. The most important involved “the authority to instruct the secretariat and communicate with the C[lean] D[evelopment] M[echanism] E[xecutive] B[oard] on the allocation and forwarding of C[ertified] E[mission] R[eductions]” This is the precise power that was measured in this study. This power of attorney may be “sole,” “shared,” or “joint” though the vast majority were either “sole” or “joint.” Additional rows were included and identified as “joint” or “shared” when applicable. When a buyer had the sole right to provide instructions, it was assigned 1. When a buyer had joint or shared rights with another buyer, each buyer was assigned .50 in order to create Figure 7.

Summary		
Total Number of Projects in China - 2168i		
Power of Attorney Holders	Number of Projects	Percentage of Projects**
No Power of Attorney on Record	101	4.659%
Only Chinese Party	142	6.550%
International Buyer	1925	88.792%

Total number of registered projects as of July 7, 2012.

2 Percentage calculated based on total number of China projects (i.e., 2,168).

International Buyers

	Power of Attorney Holders	Number of Projects	Percentage of 2,168 Projects	Type of Rights	Projects
1	AandT Carbon Asset Co., Limited	1	0.046%	Sole	1
2	ACT Carbon Capital Ltd.	5	0.231%	Sole	5
3	Arcadia Energy (Suisse) S.A.	6	0.277%	Sole	2
				Joint	4
4	Arreon Carbon*	53	2.445%	Sole	43

	Power of Attorney Holders	Number of Projects	Percentage of 2,168 Projects	Type of Rights	Projects
				Joint	10
5	Asian Development Bank, as Trustee for the Asia Pacific Carbon Fund ^{† ††}	17	0.830%	Sole	8
				Joint	8
6	Asian Development Bank, as Trustee for the Asia Pacific Carbon Fund and the Future Carbon Fund ^{† ††}	1	0.830%	Sole	
				Joint	1
7	Asja Environment International B.V. Mendrisio Branch	2	0.092%	Sole	2
8	Barclays Bank PLC	12	0.554%	Sole	12
9	Biogas Technology Ltd	2	0.092%	Sole	2
10	BKW FMB Energie AG	2	0.092%	Sole	
				Joint	2
11	Blue World Carbon Capital PCC	6	0.277%	Sole	
				Shared	2
				Joint	4
12	BNP Paribas	5	0.231%	Sole	1
				Joint	4
13	Bunge Emissions Holdings S.A.R.L.	7	0.323%	Sole	7
14	Cambridge Funds Investment Co., Ltd	7	0.323%	Sole	7
15	Camco [*]	52	2.399%	Sole	30
				Joint	22
16	Cantor Fitzgerald Europe	1	0.046%	Sole	1
17	Carbon Asset	148.5	6.850%	Sole	144

	Power of Attorney Holders	Number of Projects	Percentage of 2,168 Projects	Type of Rights	Projects
	Management ^{***}			Shared	3.5
				Joint	1
18	Carbon Capital Management ^{***}	16	0.738%	Sole	8
				Shared	1.5
				Joint	6.5
19	Carbon Resource Management [*]	126	5.812%	Sole	83
				Joint	43
20	Cargill International S.A. [*]	29	1.338%	Sole	29
21	Caspervandertak Consulting BV	1	0.046%	Sole	1
22	CCAN Consulting GmbH ^{**}	0.5	0.023%	Sole	
				Joint	0.5
23	Ceres Carbon Securities Ltd.	2	0.092%	Sole	2
24	ČEZ, a.s.	3	0.138%	Sole	3
25	CF Carbon Fund II Limited	10	0.461%	Sole	10
26	CFL Carbon Limited	1	0.046%	Sole	1
27	China Carbon N.V. ^{**}	8	0.369%	Sole	6
				Joint	2
28	Chubu Electric Power Co., Inc.	4	0.185%	Sole	4
29	Citigroup Global Markets Limited	5	0.231%	Sole	
				Joint	5
30	Climate Bridge Ltd.	6	0.277%	Sole	5
				Joint	1

	Power of Attorney Holders	Number of Projects	Percentage of 2,168 Projects	Type of Rights	Projects
31	Climate Cent Foundation	1	0.046%	Sole	1
32	Climate Change Capital*	25	1.153%	Sole	25
33	Climate Change Investment II S.A.SICAR ^{††}	1	0.046%	Sole	
				Joint	1
34	Climate Corporation Emissions Trading GmbH	18	0.830%	Sole	18
35	Climate Opportunity Fund Ky ^{††}	0.5	0.023%	Sole	
				Joint	0.5
36	Climate Protection Invest AG ^{††}	3.5	0.161%	Sole	2
				Joint	1.5
37	ConocoPhillips (U.K.)*	6	0.277%	Sole	
				Joint	6
38	Credit Suisse International	18	0.830%	Sole	7
				Joint	11
39	Daewoo International (Deutschland) GmbH	2	0.092%	Sole	2
40	Daiwa*	7	0.323%	Sole	7
41	Danish Energy Agency*	10	0.461%	Sole	4
				Joint	6
42	Deutsche Bank*	23	1.061%	Sole	23
43	Dexia Carbon Capital S.a.r.l	3	0.138%	Sole	3
44	ECO Asset Incorporated*	21	0.969%	Sole	5
				Joint	16
45	E.ON Carbon Sourcing GmbH ^{††}	0.5	0.023%	Sole	

	Power of Attorney Holders	Number of Projects	Percentage of 2,168 Projects	Type of Rights	Projects
				Joint	0.5
46	ECO BANK LTD	1	0.046%	Sole	1
47	Eco-Carbone S.A.S ^{††}	0.5	0.023%	Sole	
				Joint	0.5
48	Eco-Frontier Carbon Partners Limited ^{††}	1	0.046%	Sole	
				Joint	1
49	ecolutions Trading GmbH ^{††}	0.5	0.023%	Sole	
				Joint	0.5
50	EcoSecurities [*]	118	5.443%	Sole	88
				Joint	30
51	Eco-Tec Asia (UK) Ltd.	6	0.277%	Sole	6
52	EDF Trading ^{**††}	72	3.321%	Sole	49
				Joint	23
53	Edison Spa	10	0.461%	Sole	10
54	Electrabel NV/SA ^{††}	18.5	0.853%	Sole	3
				Joint	15.5
55	ELECTRADE S.p.A.	1	0.046%	Sole	1
56	Electric Power Development Co., Ltd.	8	0.369%	Sole	8
57	Emissionshandels Gesellschaft Bavaria GmbH	3	0.138%	Sole	3
58	EnBW Trading GmbH	7	0.323%	Sole	6
				Joint	1
59	Endesa [*]	11	0.507%	Sole	1

	Power of Attorney Holders	Number of Projects	Percentage of 2,168 Projects	Type of Rights	Projects
				Joint	10
60	Eneco Energy Trade B.V. ^{††}	5.5	0.254%	Sole	4
				Joint	1.5
61	ENEL Trade SpA	46	2.122%	Sole	44
				Joint	2
62	Energy Systems International B.V.	31	1.430%	Sole	30
				Joint	1
63	Equity + Environmental Assets Ireland Limited	7	0.323%	Sole	7
64	Essent Trading [*]	6	0.277%	Sole	2
				Joint	4
65	Europe New Energy Investment Capital Limited	2	0.092%	Sole	1
				Joint	1
66	First Carbon Fund Ltd	1	0.046%	Sole	1
67	First Climate (Switzerland) AG	2	0.092%	Sole	2
68	Gaisi Peony [*]	2	0.092%	Sole	2
69	Gazprom Marketing and Trading ^{*††}	8.5	0.392%	Sole	6
				Joint	2.5
70	General Energy Capital Co., Ltd.	4	0.185%	Sole	4
71	GETEC Climate Projects GmbH	6	0.277%	Sole	2
				Joint	4
72	Goldman Sachs International	2	0.092%	Sole	
				Joint	2

	Power of Attorney Holders	Number of Projects	Percentage of 2,168 Projects	Type of Rights	Projects
73	Greenscot Limited	1	0.046%	Sole	1
74	GreenStream Network Plc ^{††}	19.5	0.899%	Sole	12
				Shared	0.5
				Joint	7
75	Grey K Environmental (Europe) II Ltd.	1	0.046%	Sole	1
76	Grütter Consulting AG ^{††}	1.5	0.069%	Sole	1
				Joint	0.5
77	Gunvor International B.V. Amsterdam Geneva Branch ^{††}	13.5	0.623%	Sole	9
				Shared	0.5
				Joint	4
78	HANWHA Europe GmbH	1	0.046%	Sole	1
79	Holcim Environment Services S.A.	4	0.185%	Sole	
				Joint	4
80	ICECAP Carbon Portfolio Limited	1	0.046%	Sole	1
81	ICF - International Clean Fund*	4	0.185%	Sole	4
82	IFC-Netherlands Carbon Facility (INCaF)	1	0.046%	Sole	
				Joint	1
83	ING Bank N.V.	1	0.046%	Sole	1
84	Innovative Carbon Investment Corporation	3	0.138%	Sole	3
85	International Bank for Reconstruction and Development (IBRD)*	2	0.092%	Sole	2
86	International Bank for	18	0.830%	Sole	17

	Power of Attorney Holders	Number of Projects	Percentage of 2,168 Projects	Type of Rights	Projects
	Reconstruction and Development (IBRD) as Trustee [*]			Joint	1
87	International Finance Corporation as Trustee of the IFC-Netherlands Carbon Facility (INCaF)	2	0.092%	Sole	
				Joint	2
88	ITOCHU Corporation	4	0.185%	Sole	3
				Joint	1
89	J.P. Morgan Ventures Energy Corporation	3	0.138%	Sole	3
90	Japan Carbon Finance, Ltd.	6	0.277%	Sole	6
91	JGC Corporation	4	0.185%	Sole	4
92	J-TEC Co., Ltd. ^{††}	4.5	0.208%	Sole	
				Joint	4.5
93	Kansai Electric Power Co., Inc. [*]	5	0.231%	Sole	1
				Joint	4
94	KfW [*]	16	0.738%	Sole	16
95	Kommunalkredit Public Consulting ^{*††}	40.5	1.868%	Sole	38
				Joint	2.5
96	Kyushu Electric Power Co., INC.	1	0.046%	Sole	1
97	Lakewood Carbon Corp. ^{††}	5	0.231%	Sole	4
				Joint	1
98	Luso Carbon Fund ^{*††}	6.5	0.300%	Sole	6
				Joint	0.5

	Power of Attorney Holders	Number of Projects	Percentage of 2,168 Projects	Type of Rights	Projects
99	Macquarie Bank Limited	20	0.923%	Sole	18
				Joint	2
100	Marubeni Corporation	40	1.845%	Sole	39
				Joint	1
101	Masefield New Energies AG	1	0.046%	Sole	1
102	Mercuria Energy Trading S.A.	21	0.969%	Sole	11
				Joint	10
103	Merrill Lynch Commodities (Europe) Limited	6	0.277%	Sole	
				Joint	6
104	MGM Carbon Portfolio S.a.r.l.	37	1.707%	Sole	37
105	Ministry for Foreign Affairs of Finland	1	0.046%	Sole	1
106	Mitsubishi*	56	2.583%	Sole	52
				Joint	4
107	Mitsui and Co., Ltd	13	0.600%	Sole	10
				Joint	3
108	Morgan Stanley and Co. International plc	4	0.185%	Sole	4
109	National Bio Energy Co., Ltd.††	0.5	0.023%	Sole	
				Joint	0.5
110	NATIXIS Environnement and Infrastructures	12	0.554%	Sole	12
111	Natsource*	9	0.415%	Sole	8
				Joint	1

	Power of Attorney Holders	Number of Projects	Percentage of 2,168 Projects	Type of Rights	Projects
112	New Energy and Industrial Technology Development Organization	3	0.138%	Sole	3
113	Nippon Steel Corporation	1	0.046%	Sole	
				Shared	1
114	NL Agency	1	0.046%	Sole	1
115	Noble Carbon Credits	38	1.753%	Sole	27
				Joint	11
116	Nomura International Plc	4	0.185%	Sole	1
				Joint	3
117	Nordic Carbon Fund Ky	1	0.046%	Sole	
				Joint	1
118	Norwegian Ministry of Finance	20	0.923%	Sole	1
				Joint	19
119	Nuon Energy Trade and Wholesale	1	0.046%	Sole	1
120	OneCarbon International B.V.	9	0.415%	Sole	7
				Joint	2
121	ORBEO	4	0.185%	Sole	3
				Joint	1
122	Origin Carbon Management Limited	6	0.277%	Sole	6
123	Originate Carbon [*]	5	0.231%	Sole	4
				Joint	1
124	PEAR Carbon Offset	1	0.046%	Sole	

	Power of Attorney Holders	Number of Projects	Percentage of 2,168 Projects	Type of Rights	Projects
	Initiative, Ltd. ^{††}			Joint	1
125	Post 2012 Carbon Credit Fund C.V. ^{††}	4	0.185%	Sole	1
				Joint	3
126	Primary Carbon International Limited	1	0.046%	Sole	1
127	Q.C.A. AG ^{††}	4.5	0.208%	Sole	4
				Joint	0.5
128	Rabobank International*	5	0.231%	Sole	2
				Joint	3
129	Renaissance Carbon Investment Ltd.	7	0.323%	Sole	7
130	RWE*	99	4.566%	Sole	74
				Joint	25
131	Shell Trading International*	21	0.969%	Sole	3
				Joint	18
132	Showa Shell Sekiyu K.K.	1	0.046%	Sole	1
133	Sindicatum Carbon Capital*	10	0.461%	Sole	10
134	Smart Energy Co., Ltd.	4	0.185%	Sole	4
135	Sojitz Corporation	1	0.046%	Sole	1
136	Solvay Energy Services SAS ^{††}	3.5	0.161%	Sole	2
				Joint	1.5
137	South Pole Carbon Asset Management Ltd.	7	0.323%	Sole	7
138	SSE Energy Supply Ltd.	4	0.185%	Sole	4
139	Standard Bank Plc ^{††}	8.5	0.392%	Sole	8

	Power of Attorney Holders	Number of Projects	Percentage of 2,168 Projects	Type of Rights	Projects
				Joint	0.5
140	Sumitomo Corporation ^{††}	18.5	0.853%	Sole	6
				Joint	12.5
141	Swedish Energy Agency*	2	0.092%	Sole	2
142	Swiss Carbon Assets Ltd.	2	0.092%	Sole	2
143	Tepia Corporation Japan Co., Ltd.	3	0.138%	Sole	3
144	The Chugoku Electric Power Co., Inc.	1	0.046%	Sole	1
145	Tokyo Electric Power*	8	0.369%	Sole	3
				Joint	5
146	Total Gas and Power Limited	9	0.415%	Sole	2
				Joint	7
147	Toyota Tsusho Corporation	2	0.092%	Sole	2
148	Trading Emissions*	34	1.568%	Sole	34
149	Tricorona Carbon Asset Management Pte Ltd ^{††}	3.5	0.161%	Sole	
				Shared	3.5
150	Ultimate Carbon Trading Ltd	2	0.092%	Sole	2
151	United Carbon Credits Limited	2	0.092%	Sole	2
152	UPM Umwelt-Projekt-Management GmbH	2	0.092%	Sole	2
153	Vattenfall Energy Trading Netherlands N.V. ^{††}	6	0.277%	Sole	5
				Joint	1
154	Vitol S.A.	98	4.520%	Sole	75

	Power of Attorney Holders	Number of Projects	Percentage of 2,168 Projects	Type of Rights	Projects
				Joint	23
155	Voestalpine AG	4	0.185%	Sole	4
156	WCCI World Carbon Credit Investment Limited	2	0.092%	Sole	2
157	Wienerberger AG	1	0.046%	Sole	1
158	Zero Emissions Technologies, S.A.	1	0.046%	Sole	1
	Total Projects with International Buyers	1925			

* These entities include related entities. For a detailed break-up of each individual entity's share, see Table 2 below.

† The entry Asian Development Bank, as Trustee for the Asia Pacific Carbon Fund, has been split into two entries, (a) when Asia Pacific Carbon Fund was the sole buyer, and (b) when two buyers, the Asia Pacific Carbon Fund and the Future Carbon Fund, were involved, but both conferred trustee status on the Asian Development Bank.

†† For projects that involved two buyers, rather than one, each buyer's share was halved. This explained the fractions in the number of projects. For a full list of such buyers who together bought a project, see Table 3 below.

TABLE 2: INDIVIDUAL CORPORATE ENTITIES
(COMBINED IN TABLE 1 AND FIGURE 7)

Methodology: As noted in Table 1, the vast majority of projects were granted "sole" power of attorney. When the powers of attorney granted were "shared" or "joint," rows to that effect were included in the Table below.

	Corporate Group (named in Table 1)	Company Name	Number of Projects under Company	Percentage of Projects	Type of Rights	Projects
1	Arreon Carbon	Arreon Carbon Trading Limited	21	0.969%	Sole	11
					Joint	10
		Arreon Carbon UK Limited	14	0.646%	Sole	14

	Corporate Group (named in Table 1)	Company Name	Number of Projects under Company	Percentage of Projects	Type of Rights	Projects
		Arreon Carbon UK Ltd.	18	0.830%	Sole	18
2	Camco	Camco Carbon Credits Limited			Sole	6
					Joint	6
		Camco Carbon Limited			Sole	17
					Joint	15.5
		Camco International Limited			Sole	6
					Joint	.5
Camco International Ltd.	1	0.046%	Sole	1		
3	Carbon Asset Management	Carbon Asset Management Sweden AB			Sole	121
					Shared	2
					Joint	1
		Carbon Asset Management Sweden Pte Ltd.			Sole	23
					Shared	1.5
4	Carbon Capital Management	Carbon Capital Management (Japan)	1	0.046%	Sole	1
		Carbon Capital Management, Inc.			Sole	5
					Shared	0.5
					Joint	4
		Carbon Capital Management, Inc. (Japan)			Sole	1
					Shared	1
Joint	3.5					

	Corporate Group (named in Table 1)	Company Name	Number of Projects under Company	Percentage of Projects	Type of Rights	Projects
5	Carbon Resource Management	Carbon Resource Management Ltd.	8	0.369%	Sole	7
					Joint	1
		Carbon Resource Management S.A.	118	5.443%	Sole	76
					Joint	42
6	Cargill International	Cargill International S.A.	10	0.461%	Sole	10
		Green Hercules Trading Limited	18	0.830%	Sole	18
		Green Hercules Trading Limited (A Cargill Company)	1	0.046%	Sole	1
7	Climate Change Capital	Climate Change Capital Carbon Fund II s.á r.l	23	1.061%	Sole	23
		Climate Change Capital Carbon Managed Account Limited	1	0.046%	Sole	1
		Climate Change Capital China Limited	1	0.046%	Sole	1
8	ConocoPhillips (U.K.)	ConocoPhillips (U.K.) Ltd.	2	0.092%	Sole	
					Joint	2
		ConocoPhillips (U.K.) Limited	4	0.185%	Sole	
					Joint	4
9	Daiwa	Daiwa PI Partners Co. Ltd.	4	0.185%	Sole	4
		Daiwa Securities SMBC Co. Ltd.	2	0.092%	Sole	2

	Corporate Group (named in Table 1)	Company Name	Number of Projects under Company	Percentage of Projects	Type of Rights	Projects
		Daiwa Securities SMBC Principal Investments Co., Ltd.	1	0.046%	Sole	1
10	Danish Energy Agency	Danish Ministry of Climate and Energy, Danish Energy Agency	4	0.185%	Sole	4
		The Danish Energy Agency	6	0.277%	Sole	6
11	Deutsche Bank	Deutsche Bank AG	5	0.231%	Sole	5
		Deutsche Bank AG (Filiale London)	5	0.231%	Sole	5
		Deutsche Bank AG, London Branch	13	0.600%	Sole	13
12	ECO Asset Incorporated	ECO Asset Incorporated was combined with Eco Asset Incorporated				
13	EcoSecurities	EcoSecurities Carbon 1 Ltd.	5	0.231%	Sole	5
		EcoSecurities Group Limited	1	0.046%	Sole	1
		EcoSecurities Group Plc	70	3.229%	Sole	48
					Joint	22
		EcoSecurities International Limited	30	1.384%	Sole	25
					Joint	5
EcoSecurities International Ltd	1	0.046%	Sole	1		

	Corporate Group (named in Table 1)	Company Name	Number of Projects under Company	Percentage of Projects	Type of Rights	Projects
		EcoSecurities Ltd.	11	0.507%	Sole	8
					Joint	3
14	EDF Trading	EDF Trading Limited	62.5	2.883%	Sole	49
					Joint	23.5
		EDF Trading Ltd	9.5	0.438%	Sole	5
					Joint	4.5
15	Endesa	Endesa Carbono S.L.	4	0.185%	Sole	0
					Joint	4
		Endesa Generación S.A.	7	0.323%	Sole	1
					Joint	6
16	ENEL Trade SpA	ENEL Trade SpA was combined with Enel Trade SpA				
17	Essent Trading	Essent Energy Trading B.V.	2	0.092%	Sole	1
					Joint	1
		Essent Trading International S.A.	4	0.185%	Sole	1
					Joint	3
18	Gaisi Peony	Gaisi Peony Capital s.a.r.l	1	0.046%	Sole	1
		Gaisi Peony Carbon Capital s.a.r.l	1	0.046%	Sole	1
19	Gazprom Marketing and Trading	Gazprom Marketing and Trading Limited	1.5	0.069%	Sole	1
					Joint	0.5
		Gazprom Marketing and	2	0.092%	Sole	2

	Corporate Group (named in Table 1)	Company Name	Number of Projects under Company	Percentage of Projects	Type of Rights	Projects
		Trading Ltd.				
		Gazprom Marketing and Trading Singapore Pte. Ltd.	5	0.231%	Sole	3
					Joint	2
20	ICF - International Clean Fund	ICF - International Clean Fund LLC	2	0.092%	Sole	2
		ICF - International Clean Fund LLC Lewes, Mendrisio Branch	2	0.092%	Sole	2
21	International Bank for Reconstruction and Development (IBRD)	International Bank for Reconstruction and Development (IBRD)	1	0.046%	Sole	1
		International Bank for Reconstruction and Development (IBRD) (the Netherlands, Italy and other Parties)	1	0.046%	Sole	1
22	International Bank for Reconstruction and Development	IBRD as Trustee of the BioCarbon Fund	1	0.046%	Sole	1
		IBRD as Trustee of the Italian Carbon Fund	1	0.046%	Sole	1
		International Bank for	2	0.092%	Sole	2

	Corporate Group (named in Table 1)	Company Name	Number of Projects under Company	Percentage of Projects	Type of Rights	Projects
	(IBRD) as Trustee	Reconstruction and Development (IBRD) as Trustee for the Danish Carbon Fund				
		International Bank for Reconstruction and Development (IBRD) as Trustee of the Carbon Funds	1	0.046%	Sole	1
		International Bank for Reconstruction and Development (IBRD) as Trustee of the Community Development Carbon Fund (CDCF)	4	0.185%	Sole	4
		International Bank for Reconstruction and Development (IBRD) as Trustee of the Netherlands CDM Facility (NCDMF)	1	0.046%	Sole	1
		International Bank for Reconstruction	1	0.046%	Sole	1

	Corporate Group (named in Table 1)	Company Name	Number of Projects under Company	Percentage of Projects	Type of Rights	Projects
		and Development (IBRD) as Trustee of the Prototype Carbon Fund (PCF)				
		International Bank for Reconstruction and Development (IBRD) as Trustee of the Spanish Carbon Fund (SCF)	3	0.138%	Sole	3
		International Bank for Reconstruction and Development as Trustee of the First Tranche of the Umbrella Carbon Facility	1	0.046%	Sole	1
		International Bank for Reconstruction and Development as Trustee of the Italian Carbon Fund	1	0.046%	Sole	1
		International Bank for Reconstruction and Development as Trustee of the	1	0.046%	Sole	
					Joint	1

	Corporate Group (named in Table 1)	Company Name	Number of Projects under Company	Percentage of Projects	Type of Rights	Projects
		PCF and NCDMF				
		The International Bank for Reconstruction and Development (IBRD) as Trustee of the BioCarbon Fund	1	0.046%	Sole	1
23	KfW	KfW	13	0.600%	Sole	13
		KfW Bankengruppe	3	0.138%	Sole	3
24	Kommunalkredit Public Consulting	Kommunalkredit Public Consulting	1	0.046%	Sole	1
		Kommunalkredit Public Consulting GmbH	39.5	1.822%	Sole	37
					Joint	2.5
25	Lakewood Carbon Corp.	Lakewood Carbon Corp. was combined with LAKEWOOD CARBON CORP.				
26	Luso Carbon Fund	Luso Carbon Fund	5.5	0.254%	Sole	4.5
					Joint	1
		Luso Carbon Fund – Fundo Especial de Investimento Fechado	1	0.046%	Sole	1

	Corporate Group (named in Table 1)	Company Name	Number of Projects under Company	Percentage of Projects	Type of Rights	Projects
27	Mitsubishi	Mitsubishi Corporation	52	2.399%	Sole	49
					Joint	3
		Mitsubishi Heavy Industries, Ltd.	1	0.046%	Sole	
					Joint	1
		Mitsubishi UFJ Morgan Stanley Securities Co., Ltd.	2	0.092%	Sole	2
Mitsubishi UFJ Securities Co., Ltd.	1	0.046%	Sole	1		
28	NATIXIS Environnement and Infrastructures	NATIXIS Environnement and Infrastructures was combined with Natixis Environnement and Infrastructures				
29	Natsource	Natsource Asset Management Corp.	3	0.138%	Sole	2
					Joint	1
		Natsource Asset Management Corporation	3	0.138%	Sole	3
		Natsource Europe Limited	2	0.092%	Sole	2
		Natsource Europe Ltd.	1	0.046%	Sole	1
30	Noble Carbon Credits	Noble Carbon Credits Limit	1	0.046%	Sole	
					Joint	1
		Noble Carbon	34	1.568%	Sole	25

	Corporate Group (named in Table 1)	Company Name	Number of Projects under Company	Percentage of Projects	Type of Rights	Projects			
		Credits Limited			Joint	9			
		Noble Carbon Credits Ltd.	3	0.138%	Sole	2			
					Joint	1			
31	ORBEO	ORBEO was combined with Orbeo							
32	Originate Carbon	Originate Carbon Limited	2	0.092%	Sole	2			
		Originate Carbon Ltd.	3	0.138%	Sole	2			
					Joint	1			
33	Rabobank International	Cooperatieve Centrale Raiffeisen Boerenleenbank B.A. (trading as) Rabobank International London Branch	1	0.046%	Sole	1			
					Rabobank International	3	0.138%	Sole	1
								Joint	2
		Rabobank International, London Branch	1	0.046%	Sole				
				Joint	1				
34	RWE	RWE Power AG	43	1.983%	Sole	41			
					Joint	2			
		RWE Power Aktiengesellschaft	6	0.277%	Sole	6			
		RWE Supply and Trading Netherlands B.V.	6	0.277%	Sole	6			

	Corporate Group (named in Table 1)	Company Name	Number of Projects under Company	Percentage of Projects	Type of Rights	Projects
		RWE Supply and Trading Switzerland S.A.	44	2.030%	Sole	21
					Joint	23
35	Shell Trading International	Shell Trading International Limited	11	0.507%	Sole	3
					Joint	8
		Shell Trading International Limited (UK)	2	0.092%	Sole	
					Joint	2
		Shell Trading International Ltd.	7	0.323%	Sole	
					Joint	7
Shell Trading International Ltd.(UK)	1	0.046%	Sole			
			Joint	1		
36	Sindicatum Carbon Capital	Sindicatum Carbon Capital (Cayman) Limited	3	0.138%	Sole	3
		Sindicatum Carbon Capital (China) Ltd.	1	0.046%	Sole	1
		Sindicatum Carbon Capital Ltd.	6	0.277%	Sole	6
37	Swedish Energy Agency	Government of Sweden - Swedish Energy Agency	1	0.046%	Sole	1
		Swedish CDM and JI Programme International Climate Policy Section Swedish Energy Agency	1	0.046%	Sole	1

	Corporate Group (named in Table 1)	Company Name	Number of Projects under Company	Percentage of Projects	Type of Rights	Projects
38	Tokyo Electric Power	The Tokyo Electric Power Co., Inc.	3	0.138%	Sole	1
					Joint	2
		The Tokyo Electric Power Company, Inc.	2	0.092%	Sole	1
					Joint	1
		The Tokyo Electric Power Company, Incorporated	2	0.092%	Sole	
					Joint	2
Tokyo Electric Power Co.	1	0.046%	Sole	1		
39	Total Gas and Power Limited	Total Gas and Power Limited was combined with TOTAL Gas and Power Limited				
40	Trading Emissions	Trading Emissions Limited	1	0.046%	Sole	1
		Trading Emissions PLC	33	1.522%	Sole	33

TABLE 3 – LIST OF PROJECTS INVOLVING TWO BUYERS

	Buyer 1	Buyer 2	Project Name
1	Asian Development Bank, as trustee of the Future Carbon Fund	Asian Development Bank, as trustee of the Asia Pacific Carbon Fund	Heqing Solar Cooker Project II
2	Asian Development Bank, as trustee of the Future Carbon Fund	Asian Development Bank, as trustee of the Asia Pacific Carbon Fund	Heqing Solar Cooker Project I

	Buyer 1	Buyer 2	Project Name
3	Eco-Frontier Carbon Partners Limited	Carbon Capital Management, Inc.	Fujian Cement 4# and 5# kilns Waste Heat Recovery for Power Generation Project
4	Gunvor International B.V. Amsterdam Geneva Branch	Carbon Capital Management, Inc.	Hunan Waste Gas Based Power Project in Liangang Group
5	Gunvor International B.V. Amsterdam Geneva Branch	Carbon Capital Management, Inc.	Yunnan Sayutuo 60MW Hydro Power Project
6	Gunvor International B.V. Amsterdam Geneva Branch	Carbon Capital Management, Inc. (Japan)	Gansu Wuwei 23MW Zamusi Hydropower Project
7	Solvay Energy Services SAS	CCAN Consulting GmbH	Shuangpai County Yongjiang Cascade Hydropower Project, Hunan, P.R. China
8	Kommunalkredit Public Consulting GmbH (“KPC”)	China Carbon N.V.	Sichuan provincial Longchi and Caoyuan 9 MW Small-scale Hydro Power Bundle Project
9	Post 2012 Carbon Credit Fund CV	Climate Change Investment II S.A. SICAR	Shenmu County Jieneng Multipurpose Use Power Co. Ltd. 100MW Semi-coke Waste Gas for Power Generation

	Buyer 1	Buyer 2	Project Name
			Project
10	GreenStream Network Plc	Climate Opportunity Fund Ky	Sichuan Fangdaping Hydropower Project
11	PEAR Carbon Offset Initiative, Ltd.	E.ON Carbon Sourcing GmbH	Sichuan Guang'an Caishandong Coal Mine CMM Power Generation Project
12	EDF Trading Ltd.	Eco-Carbone S.A.S	Yangquan Nanmei (Group) Co., Ltd. Coalmine Methane Utilization Project
13	Carbon Capital Management, Inc.	Eco-Frontier Carbon Partners Limited	Wuda Wuhushan Coal Mine Methane Power Generation Project
14	Gazprom Marketing and Trading Limited	ecolutions Trading GmbH	Hunan Daxing Small Hydropower Project
15	Standard Bank Plc	Electrabel NV/SA	Hainan Gezhen Hydropower Project
16	China Carbon N.V.	Eneco Energy Trade B.V.	Shaanxi Shenmu Hengdong Waste Gas Based Electricity Generation Project
17	Carbon Capital Management, Inc.	Gunvor International B.V. Amsterdam Geneva Branch	Shaanxi Provincial Yang County Kafang

	Buyer 1	Buyer 2	Project Name
			12 MW Small-scale Hydro Power Project
18	Carbon Capital Management, Inc. (Japan)	Gunvor International B.V. Amsterdam Geneva Branch	15MW Waste Heat Recovery and Power Generation Project in Jiangsu Helin Cement Co., Ltd.
19	Carbon Capital Management, Inc.	Gunvor International B.V. Amsterdam, Geneva Branch	Jiexiu City Guotai Green Energy Co., Ltd Biomass Power Generation Project in Shanxi Province
20	Carbon Capital Management, Inc.(Japan)	Gunvor International B.V. Amsterdam, Geneva Branch	Waste Heat Recovery and Power Generation Project in Jilin Yatai Group Mingcheng Cement Co., Ltd.
21	Carbon Capital Management, Inc.	Gunvor International B.V. Amsterdam, Geneva Branch	Waste Heat Recovery and Power Generation Project in Yatai Group Harbin Cement Co., Ltd.
22	Sumitomo Corporation	J-TEC Co., Ltd.	Xiamen Eastern Municipal Solid Waste Incineration Project
23	Grütter Consulting	Luso Carbon Fund	BRT

	Buyer 1	Buyer 2	Project Name
	AG		Zhengzhou, China
24	EDF Trading Limited	National Bio Energy Co., Ltd.	Xinjiang Awati Biomass Power Generation Project
25	Gunvor International B.V. Amsterdam Geneva Branch	PEAR Carbon Offset Initiative, ltd.	Sichuan Carbide Calcium Residues Based Cement Plant Project in Leshan City
26	Climate Change Investment II S.A.SICAR	Post 2012 Carbon Credit Fund C.V.	Gansu Longwangtai Hydropower Project
27	Climate Protection Invest AG	Q.C.A. AG	Lintan Qingshishan Hydropower Station Expansion Project
28	Lakewood Carbon Corp.	Solvay Energy Services SAS	Methane Recovery Project of Jilin Province Xintianlong Alcohol Co., Ltd.
29	Lakewood Carbon Corp.	Solvay Energy Services SAS	Methane Recovery Project of Meihekou City Fukang Alcohol Co., Ltd.
30	Carbon Asset Management Sweden AB	Tricorona Carbon Asset Management Pte Ltd	Guizhou Qingshuitang 9MW Hydro Project
31	Carbon Asset Management Sweden	Tricorona Carbon Asset Management Pte	Liangshan Chunheweishui

	Buyer 1	Buyer 2	Project Name
	AB	Ltd	Small Hydropower Project
32	Carbon Asset Management Sweden AB.	Tricorona Carbon Asset Management Pte Ltd.	Qijiaping Hydropower Project in Gansu Province
33	Carbon Asset Management Sweden Pte Ltd	Tricorona Carbon Asset Management Pte. Ltd	Huadian Ningxia Ningdong Yangjiayao Wind Farm Expansion Project
34	Carbon Asset Management Sweden Pte Ltd	Tricorona Carbon Asset Management Pte. Ltd	Huadian Ningxia Ningdong 10MWp Solar PV Power Station Project
35	Carbon Asset Management Sweden Pte Ltd	Tricorona Carbon Asset Management Pte. Ltd	Huadian Ningxia Ningdong Yangjiayao Phase III Wind Farm Project
36	Carbon Asset Management Sweden AB	Tricorona Carbon Asset Management Pte. Ltd.	Musa River 1st Level Small Hydropower Project
37	China Carbon N.V.*	Vattenfall Energy Trading Netherlands N.V.	Sichuan Tiejue 25MW Hydro Power Project
38	China Carbon N.V.*	Vattenfall Energy Trading Netherlands N.V.	Longyou 18 MW Hydropower Project in Zhejiang Province

* Corrected from “China Carbon N.V.” in the original Modalities of Communication.
